IN THE

Supreme Court of the United States

OCTOBER TERM—1927.

No. 285.

HOLLAND FURNITURE COMPANY,

Petitioner,

vs.

PERKINS GLUE COMPANY,

Respondent.

BRIEF FOR PETITIONER.

Jurisdiction of the Court.

This case comes from the Circuit Court of Appeals of the Sixth Circuit to this Court on a writ of certiorari granted October 17, 1927, on petition of defendant below because of conflict on a question of infringement of reissued patent No. 13,436* between the Court of Appeals of the Sixth Circuit (R., 645), which held the patent infringed, and the Court of Appeals of the Seventh Circuit (292 Fed., 596, June 7, 1923) and the Court of Appeals of the Second Circuit (287 Fed., 109, Jan. 2, 1923),

*The original patent No. 1,020,655 (R., 1188) was issued on March 19, 1912, on application filed November 2, 1908. The application for reissue was filed May 17, 1912.

both of which held the patent not infringed, by the same product. The decree was entered in the court below on March 18, 1927 (R., 645). Opinion, 18 Fed. (2nd), 387.

BRIEF STATEMENT OF THE CASE.

Plaintiff's* patent is for a starch glue and a method of making it (R., 247). Only the product claims for the glue (claims 28, 30 and 31)** are charged to be infringed.

Defendant says that it does not use the patented glue and stands on the following propositions:

1. In the highly developed art of making glue by dissolving starch in a solution of caustic alkali, the thing patented is a particular improvement, characterized by the asserted novelty that for the glue-base a starch is chosen which has a water-absorptive property within a defined range—below the high water-absorption of ordinary untreated (raw) starch, so that to render amply fluid the finished glue comparatively little water

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*Your petitioner was defendant in the District Court and appellee in the Court of Appeals of the Sixth Circuit. Respondent was plaintiff in the District Court and appellant in the Court of Appeals. The parties will be referred to as plaintiff and defendant in this brief.

**These three claims read as follows:

"28. A glue comprising cassava carbohydrate rendered semi-fluid by digestion and having substantially the properties of animal glue.

30. A wood and fiber glue formed of a starchy carbohydrate or its equivalent by union therewith of about 3 parts or less by weight of water and alkali metal hydroxid.

31. A wood and fiber glue containing amylaceous material as a base dissolved without acid in about three parts of water or less, and being viscous, semi-fluid and unjellified."

will have to be added; and yet above that of soluble starch or dextrine so that the "tack," adhesiveness and cohesiveness of the glue suffers no measurable detriment.

2. Defendant has chosen for its glue-base an ordinary untreated starch having high water-absorptive properties above the defined range; and makes a correspondingly heavier glue, not the glue of the patent.

3. The apparently broad product claims sued on must be restricted to glue made from a starch having reduced water-absorptiveness within the range measured by the tests of the patent, and must exclude defendant's glue made from starch of higher water-absorptiveness (1) because the thing patented was glue made from starch lying within that range; (2) because prior patents to Gerard, to Dornemann, and to Marsden disclose starch glue made, like defendant's, from the more highly water-absorptive untreated starches; (3) because glue made from such high water-absorptive untreated starches was publicly used at Poplar Bluff, Missouri, for some three years before application for the Perkins' patent; (4) because the claims here in issue were sustained by the Court of Appeals of the Seventh Circuit in the *Solva case* in the year 1918 only by reading into them, on plaintiff's own representations, the specified limited range of water-absorptiveness to save them from anticipation by the prior patents and the Poplar Bluff prior use; and (5) because at the end of the *Solva* litigation plaintiff disclaimed from the patent all glue made from starch by dissolving it in an alkaline solution containing not more than three parts of water, except only glues so made from starches of which the water-absorptive properties had been reduced to within the specified range.

Defendant's position was sustained by the Court of Appeals of the Second Circuit in the *Standard Furni-*

ture Co. case (287 Fed., 109, January 2, 1923) and by the Court of Appeals of the Seventh Circuit in the *Wisconsin Chair case* (292 Fed., 596, June 7, 1923) and was denied by the Court of Appeals of the Sixth Circuit on April 2, 1927 (R., 645), in the case at bar.

Summary Statement of Facts.

(1) In the industrial manufacture during the last fifty years of starch glues and mucilages by dissolving the starch (glue-base) in a solution of caustic alkali, all grades of starch, from the highest grade (most water-absorptive) untreated (raw) starch to the wholly converted (completely degenerated) soluble starches and dextrines, have been used. For high strength glues, the high water-absorptive cassava (tapioca) and potato starches, and for lower grade products, the less water-absorptive corn and wheat starches have been chosen. The water-absorptiveness of starch has been reduced and regulated by chemical treatment, commonly referred to as "conversion" and in this record frequently referred to as "degeneration." Conversion or degeneration also occurs in nature by over-ripening of the vegetable substances from which the starch is extracted, or as a result of treatment during the extraction, or by fermentation after extraction. Conversion (degeneration), by decreasing the water-absorptiveness of the starch (glue-base), increases the fluidity of the finished glue made with a given amount of water. Conversion of the glue-base to the soluble stage largely decreases the adhesiveness of the finished glue or mucilage and is to be avoided if a strong glue is wanted; it is desirable only in mucilages of the common envelope or postage stamp variety, easily soluble in water. When starch glue is used for sizing, the manifold industrial applications of sizing have demanded starch glues of all degrees of fluidity, regulated by the

simple expedient of adjusting the amount of water to the particular starch (glue-base) employed—thinning the glue by the addition of water, or thickening it by the addition of more of the starch. The strength of the caustic alkali solution has also been left to the judgment of the glue maker. Too much alkali may stain or injure the material to which the glue is applied; the dissolving of the glue in the alkaline solution may be done in the cold, or the effect of a lesser amount of caustic may be increased by heat applied during the dissolving operation.

(2) Perkins, the patentee of plaintiff's reissued patent (granted on an application filed November 2, 1908) was a maker of starch adhesives, and had from 1905 been selling to Brooklyn Cooperage Co., of Poplar Bluff, Mo., for making glue to glue together the flat wooden pieces of barrel heads, both "heavy body" (highly water-absorptive) and "light body" (degenerated low water-absorptive) starches, and he had found that the "heavy body" untreated starches, when dissolved in a caustic alkali solution containing the small quantity of water commonly used with animal glues in woodworking (not to exceed three parts by weight of water to one of dry glue), produced a jellylike and tough glue, too thick for easy application by machinery. For the rough work of barrel heads, the glue made from the starch supplied by Perkins was used continuously at Poplar Bluff from 1905 on; but the "heavy body" glue tended to break the mixing machines, did not spread easily in the roll spreaders,* and required an amount of water that in-

*The general type of mixing machines used may be understood from the Perkins patent No. 1,109,144 (R., 311) and the general type of roll spreaders may be understood from the Perkins patent No. 1,238,810 (R., 317). These patents show machines developed to handle the Perkins glue, which, notwithstanding the increased fluidity resulting from Perkins' patented choice of starting material, was still substantially heavier than animal glue.

creased the difficulty and time of drying (R., 681). At some time during the two years prior to November 2, 1908 (as plaintiff contends and as may be admitted for the purpose of this case), Perkins succeeded in working out a starch glue that satisfied his requirements for the more refined practice of furniture veneering, and that glue is the subject-matter of his patent.

(3) The gist of Perkins' invention, and the thing patented, was the choice of a starch glue-base degenerated to within a specified range, such as would produce, when dissolved in a caustic alkali solution containing the amount of water commonly used with animal glue in wood veneering (not to exceed three parts by weight of water to one part of dry glue), a resulting glue of ample fluidity for easy application and yet without substantially impaired strength—"tack," adhesiveness and cohesiveness—as compared with the heavier glue made from untreated high water-absorptive starch.

In the patent a known process (acid treatment) of chemical degeneration was described, and the patent states just how far to carry the process and just where to stop it, to produce a glue-base having its water-absorptive properties reduced far enough to give the desired fluidity and yet not far enough to seriously impair its strength. The particular chemical *process* of degeneration was neither novel nor important; only the *degree* of degeneration was essentially involved in the patentee's purpose. It was stated that other known processes of chemical degeneration might be used and, by amendment during the prosecution of the application, that even certain grades of untreated cassava and other starches might be found that would answer the purpose. To guide the user in that wide field of choice the patentee pointed out

how by a scientifically accurate test to determine whether a particular starch of reduced water-absorptiveness (whether reduced by artificial treatment or by natural processes) lay within that particular range of water-absorptiveness that would serve as a base for his glue. That test (R., 249-50; Pat., p. 3, line 121, to p. 4, line 33) was to dissolve the starch in nine parts of water at 100 pounds steam pressure and measure its viscosity while hot. If the measured viscosity did not exceed that of water (when measured with a particular described measuring instrument—the "Perkins viscosimeter"), the starch had been reduced too far—to soluble starch—and was not a suitable glue-base because the resulting glue would be too weak. If the so measured viscosity exceeded three times that of water, the water-absorptiveness of the starch had not been reduced far enough and the resulting glue would be too thick, jellylike and tough. Starch lying within the chosen range is further described, with reference to its high limit of water-absorptiveness, by saying that the water-absorptiveness should be reduced to a point where the base, if mixed with from two to three parts of water and heated to 170° F., would result in a syrupy condition instead of a thick jellylike mass (R., 250, Pat., p. 4, line 74 to line 81).

(4) It is admitted that defendant here does not use a starch having water-absorptive properties within the range measured by the tests of the patent. It uses an ordinary commercial untreated high water-absorptive cassava starch, with continuously operated and more powerful mixing machines that handle the glue notwithstanding its heavy rubbery toughness (R., 51, 59-60).

The Issue.

The issue, therefore, is whether a woodworking glue, made by dissolving ordinary starch having high water-absorptive properties (above the range measured by the

stated tests of the patent) in an alkaline solution with three parts or less by weight of water to one part of dry starch, is within the monopoly of the patent.

ARGUMENT.

The question is a quantitative one. What degree of water-absorptiveness in the starch base characterizes the patentee's invention? Where are the metes and bounds of the patented monopoly drawn? Answers to these questions are to be looked for within the four corners of the reissued patent. The specification of the patent, addressed to men skilled in the art, uses terms of art and makes references to known practices such that a summary review of the prior art will give light to illuminate the disclosure.

(1) The Art of Making Adhesives (Glues, Mucilages and Pastes) by Dissolving Starch in Solutions of Caustic Alkali.

1. *Glues made by dissolving ordinary untreated starch in solutions of caustic alkali* (*Gerard, Dornemann and Marsden.*)

Dissolving untreated starch in a solution of caustic alkali to make strong glue was known and practiced as early as 1874. On June 30th of that year H. Gerard patented in Belgium (patent No. 34,869—R., 383) that process and the product of it, which product he named "apparatine." He said:

> "Any starches, feculas, meals, pulps of tubers and roots, may be transformed into apparatine by placing them in the presence of an alkali or alkaline salt. It is, however, more convenient, in the manufacture on a large scale, to use potato starch exclusively, and to treat it with caustic lye of potash or soda. The

materials named may be mixed in any proportion, but in order to obtain an industrial and commercial product it is necessary not to depart too much from the following proportions which experience has caused me to recognize as the best. The operation may take place at high or low temperature, under pressure or in a vacuum, the result is always the same.

Composition of apparatine by parts and by hundredths:

	Parts	Hundredths
Water	100	76.00
Potato fecula	20	16.00
25-degree potash or soda lye	10	8.00
Total	130	100.00

The fecula is first poured into the water, which is constantly stirred to keep it in suspension. The lye is then added while the stirring continues. After a few moments the mass, which was milky, suddenly becomes clear and sets to a very thick jelly, which must be agitated with energy. This operation only takes a few minutes, depending on the quantity worked upon. Its termination is recognized by there not remaining the least cloud in the mass. Experience taught me that the quality of the product improves as the energy of the stirring increases. I therefore expect to work the stirring by means of strong mechanical apparatus driven by steam. This apparatus does not present anything special and is not worth describing.*

*This description of the transformation of a milk of starch into a transparent mass in the presence of a solution of caustic alkali, when agitated with energy, is the process referred to in the record as "coming across." It is described in substantially the same language in the Perkins reissued patent (R., 248-249, Pat., p. 2, line 121, to p. 3, line 36).

Apparatine thus manufactured is a colorless, transparent, odorless substance of slightly alkaline taste, very viscous and ropy, and of a considerable adhesive power only to be compared to that of joiner's glue (*colle forte*). Exposed to air, it will only dry without decomposing or spoiling and without ever giving off any odor. Kept boiling for a long time, even until completely dried, it greatly thickens and it swells, but acts in the same way. Dried in thin plates, it shows the pliability and toughness of horn, without its fragility, for a sheet may be folded and refolded several times, without breaking it.

* * * * * * * *

To sum up, I therefore claim as my property: (1) The introduction into the industries of a product of science alone which has thus far remained without application. (2) The industrial manufacture of this new product. (3) Its application to the sizing of fabrics.

Incidentally, apparatine may advantageously replace gums, glues and gelatines in all their uses. It may also be successfully used as a thickening agent in tissue printing, and it further succeeds remarkably well in preventing the formation of scale in boilers. In a word, its applications are manifold, but the chief and most important of them is that as a sizing for fabrics."

This material—apparatine—is again described in Encyclopedie Roret (R., 273, and Miner, R., 194, 195) and again in the "Chemical Technical Pocket Manual of Recipes for the Entire Wood Industry," edited by William Schmidt, Berlin, 1882 (R., 390-392, and Walker, R., ~~356-358~~ 379-3). The author says that his manual is made up of prescriptions selected from technological journals by

'practically testing them and compiling the best in a unified book for the purposes of the wood industry" (R., 391).

On December 11, 1893, there was patented to R. J. Dornemann (French patent No. 232,781, R., 387-389), "A new industrial process for manufacturing glues from starches and their applications." For the glue-base, Dornemann took "the fecula of potatoes, of manioc (cassava), or another," and mixed it "with the quantity of water needed to turn it into a kind of milk without lumps in it." To the liquid mixture thus obtained he added with power stirring "an alkali (preferably caustic) potassium or sodium in the proportion of 20 to 30 kg. for every 100 kg. of fecula used." He said, "By using caustic potash or soda, an alkaline glue is obtained which can be put to all uses where the alkaline state is not harmful" (R., 389). If a non-alkaline glue was desired the alkali might be subjected to a supplementary neutralization by adding acid (R., 389). For certain applications, as, for example, when the glue was to be used for sizing (Grosvenor, R., 69, 375), he might further add certain inert substances giving more body to the glue. He said:

> "In sum, I claim as my invention and my exclusive property the new industrial process which I have here described for the manufacture of starch glues—with the special working (mixing) devices I have indicated; the supplementary operations provided for obtaining alkaline, neutral or acid reaction—or for increasing the consistence (body) of the manufactured product and lastly the numerous applications of the glues thus prepared, which may be used under the same conditions as well known adhesives, glues or sizes, producing much more energetic and durable effects."

The making of glue according to this patent by modern machinery is described by defendant's expert Walker (R., 380-382).

The U. S. patent to Marsden, No. 376,445, of 1888 (R., 254), disclosed the making of a similar product from raw starch. It differentiates from the Gerard patent only in the fact that Marsden, to avoid shipping water, mixes the alkali and the starch together and ships it as a dry flour; to be dissolved in water by the user to make "a paste which may be thinned by the addition of water or thickened by the addition of more of the alkali and flour" (R., 254, lines 39-41).

2. *Weaker adhesives made from starch that has been treated (degenerated) to reduce its water-absorptive properties, and is then dissolved in caustic solution.*

Where weaker starch adhesives are wanted, it has been the practice for many years to subject the starch base to a chemical process of conversion (degeneration) to reduce the water-absorptive properties toward or to the state of soluble starch or dextrine. It will be sufficient here to refer to the patents to Gerson & Sachse and to Higgins.

In 1897 Charles M. Higgins, the well-known Brooklyn manufacturer of library pastes and mucilages, patented certain improvements in the manufacture of starch pastes (U. S. patent No. 579,827, R., 256), wherein he subjected the starch to a preliminary chemical treatment to convert or degenerate it. The patent displays (R., 259, line 131 to p. 260, line 28) a thorough-going understanding of the progressive decrease of the water-absorptiveness of the starch as the chemical treatment proceeds, and a realization of the detrimental effect upon the strength of the resultant adhesive if degeneration is carried to the soluble stage. Higgins, however, for his particular purpose, carried the conversion of the starch further than

is contemplated in the Perkins reissued patent (Miner, R., 190).

On January 13, 1906, Gerson & Sachse patented in Germany (Patent No. 167,275, R., 275) a process for the preparation of a dry base for vegetable mucilage or glue by degenerating the starch with oxidizing agents in the presence of an alkali. This process corresponds to the alkali process of degeneration used commercially by plaintiff (see post, p. 28). It was carried to the same point of degeneration as in the Perkins reissued patent "between natural starch and the so-called soluble starch" (Miner, R., 181).*

In the case at bar (R., 651), the Court of Appeals said:

> "In former litigation it has been held that Gerson and Sachse, by their German patent, had disclosed substantially Perkins' first (degenerative) step and his resulting glue base. Perkins acquiesced in this result and disclaimed wholly those claims which covered the first step process or the glue base product."

In the many cases in which the Perkins reissued patent has been litigated, reference has been made to many other patents and publications relating to the making of glues, mucilages and pastes from starch previously converted to various degrees; but the foregoing are the most important ones and give an adequate picture of the general state of the art.

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*It was because of this patent that the "first step" or base process and product claims of the Perkins reissued patent were held to be invalid by the Court of Appeals of the Seventh Circuit in the Solva case in January, 1918 (251 Fed., 66).

(2) Perkins' Work.

The facts of Mr. Perkins' work are set forth at great length in the record (R., 667-1039). The evidence consists of contemporaneous correspondence, reports and transactions and the testimony of witnesses. The most illuminating testimony is that of one of the plaintiff's witnesses, Mr. Stryker, who is vice-president of the Perkins Glue Company. His testimony is contained in the record at pages 737-780.

Perkins began his work in the development of vegetable glue for veneering in 1905 at Poplar Bluff, Missouri. The plant at Poplar Bluff manufactured barrel heads by securing together (i. e., veneering) several layers of wood. Perkins developed a starch glue for this purpose which was successfully and extensively employed in commercial production for about three years before his patent application was filed (See letters, R., 915-987). The conditions in manufacturing these barrel heads were not exacting and it was not necessary to have a glue that could parallel animal glue in strength and ease of application (R., 740).

But Perkins was trying to make a glue that the furniture manufacturers would substitute for animal glue in veneering (R., 740). The furniture trade used for veneering, animal glue with three parts of water. To be as good as animal glue the vegetable glue would also have to be used with three parts of water (R., 775; R., 110).

Perkins' difficulty was with the starch constituent (R., 741). Mr. Stryker made this perfectly clear as follows (R., 769):

> "* * * I should answer your question by saying that a glue suitable for furniture veneers or veneers of that kind could never in the world be obtained from such a base. If this were possible I think Mr. Perkins would have discovered the key to the whole situation before he did, because he worked hard

enough to do it, and it was a question of getting a starch material modified in such a way, and not carried too far, but carried on to the point where that starch material would afterwards be mixed up with two and one-eighth to two and a quarter or two and one-half, possibly, parts of water and still it would retain its natural adhesion of the raw material to the extent that it would bind the wood together and make a joint which is suitable, and which is as good as the hide or animal glue joints which had been made previous to that time,"

and again (R., 775):

"Q. In your cross examination you referred to obtaining suitable consistency and the key to the situation. What do you understand to be the practical problem that Mr. Perkins had worked out in 1907?

A. I understand it to be the discovery of proper means to, in the first place, modify a starch base to a certain defined and recognized point, this modification not being carried too far but at the same time far enough; and in the requirements of the glue using industry the amount of water that could be used was restricted to certain limits, these limits being in most cases around two to two and a half parts of water. To get the proper glue base for this the natural strength or adhesiveness of the raw material had to be retained to the largest extent possible, and this Mr. Perkins succeeded in doing and his product was capable of use under practical factory conditions in that it could be mixed in required quantities and would flow readily and as required from mixing kettles to the spreader."

Perkins had found that ordinary raw starch would not give such a glue. It was too thick. And that an

over-degenerated starch would not give such a glue. It would be too weak (R., 741, 764).

So he set himself to determining what starch characteristic was necessary to give the result he desired, namely, a glue made with three parts of water that would be as good as animal glue in veneering.

After much experimentation he found that if the water-absorptiveness of the starch was within a certain range, it would give the desired result. And this starch was the vital constituent of the new glue.

So Perkins determined that one constituent of his new glue should be starch having a certain viscosity; the other constituent was water, and was specified by the furniture industry to be not over three parts. For facilitating the dissolving of the starch in water he used alkali, which was well known for this purpose regardless of the kind of starch or amount of water.

(3) The Disclosure of Plaintiff's Reissue Patent No. 13,436 of July 2, 1912.

The invention is said to relate to improvements in glue and the method of making it from "carbohydrates containing amylo-cellulose or its equivalent." This means starch.

"Starch pastes" made by "tumefying" (swelled up by cooking) ordinary starch and water, with or without the addition of ammonia, are said to lack the necessary " 'tack', viscosity, cohesiveness and tenacity to spread and adhere properly when applied as wood glues," and such pastes on cooling are said to "become extremely thick and jellylike" and so require too much water for wood working, and it is said that such pastes do not set hard enough and are not dense and elastic enough when dry (R., 247, lines 14-43).

The objects of the patented invention are then said to be to provide a glue and a method of making the same from carbohydrates which (1) "will not have the disadvantages just pointed out, but which will be exceptionally tenacious and powerful but still amply fluid for easy application" (R., 247, lines 45-49); and which (2) "will have the great practical advantage that it may be practically used for the same purposes as the best animal glue and possess certain great advantages of permanency to weather and temperature variations far superior to those of animal glue" (R., 247, lines 52-58).

A further important object is said to be "to produce an adhesive or glue base which may be stored or sold in a dry state and which may then be prepared for use by mixing up with or without the use of heat" (R., 247, lines 62-65).

This statement of objects displays dissatisfaction with ordinary starch as a glue-base. It proposes to produce from starch a new glue-base from which a glue can be made which is tenacious and powerful but still amply fluid for easy application so that it may be practically used for the same purposes as the best animal glue.

The impediments that stood in the way of these purposes are hinted at in the opening reference to the insufficiencies of "starch pastes," and are explicitly stated later in the specification as follows:

> "As previously stated, when ordinary starch is heated with water it absorbs enormous quantities of water, and if only two or three parts of water are used becomes of a stiff jellylike form which must be very much diluted before it will be practically workable. I find, however, that using my improved glue base and method of mixing the same, this water absorbing power can be greatly reduced and can be regulated, although the mixing is done with the same

> proportions of alkali and carbohydrates or else the same temperature, which have hitherto produced unworkable jellies or weakly adhesive pastes or mucilages" (R., 249, lines 60-69).

The statement here is in effect that neither ordinary untreated starch, as used in the processes of the Gerard and Dornemann patents and by the Brooklyn Cooperage Company at Poplar Bluff, nor the over-degenerated starches, such as used by Higgins, would answer the patentee's purpose. When mixed with only two or three parts of water and alkali the ordinary starch would produce what the patentee regarded as unworkable jellies, while the over-degenerated starches would produce weakly adhesive pastes or mucilages.

The self-evident expedient of diluting the "unworkable jellies" to the desired fluidity by the addition of water was excluded by the patentee's particular purpose. He wanted a starch glue that would have the same water content as animal glue when used for wood veneering. Thus he says:

> "Practically all the water must be later removed that goes into the glue solution as applied to the joints, hence an increase of water in the glue solution involves changes in drying methods, or in drying time, or in risks of injury to the material due to warping by the extra water, all of very serious consequence" (R., 250, lines 85-92).
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> "Thus it is of the greatest importance and value to produce a concentrated glue solution ready for application which parallels the animal glue solutions now employed industrially, in respect to water contents and physical properties in application, and is equal or superior as to strength and permanency" (R., 250, lines 101-108).

The general practice with animal glue in wood veneering was to use about 2½ parts of water, the limits being from about 1 part of water to as high as 3½ parts of water (Grosvenor, R., 110). The animal glue was dissolved in the water by heat and when so dissolved had the fluidity of a good maple syrup or a heavy pea soup.

The First Step of the Patent.

The idea of means by which the patentee achieved his purpose—avoiding the too great viscosity of glue made from ordinary untreated starch, on the one hand, and the too weakly adhesive qualities of glues or mucilages made from over-degenerated starch, on the other hand—is stated as follows:

> "To do this I first take a carbohydrate of the proper kind and treat it with a reagent to decrease its water absorptive properties in the sense that to render fluid the finished glue, comparatively little water will have to be added and the final glue will not thereby become seriously diluted" (R., 247, lines 68-74).
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> "The preliminary treatment, however, substantially reduces the absorption of water by the starch and prevents it from becoming jellylike and tough when afterward treated either with the water as above indicated or with the alkali, or both" (R., 249, lines 84-89).
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> "Experiments indicate that after the carbohydrate base has been treated in accordance with the first step of my process, the proportion of amylo-cellulose in the carbohydrate granule has been increased. I believe this increase in the percentage or proportion of the amylo-cellulose in the carbohydrate allows of the same to be changed into a good glue

with very much less water than would otherwise be required" (R., 249, lines 112-121).

He proposes to use as a reagent any starch converting agent capable of converting starch into soluble starch and dextrin, taking care so to control the reaction that the starch will not be wholly converted into the soluble form (R., 247, lines 75-88).

The use of acids and oxidizing agents to convert ordinary starch into soluble starch and dextrin was well known. It was not the reagent used, but the degree of degeneration effected by it, that was involved in the patentee's purpose. The essential characteristic of this first step lay not in the *manner* but in the *degree* of conversion or degeneration. He says:

"* * * it is not my object to convert the starch wholly but only to effect its physical properties when put into solution or dissolved to form glue. The effect of this treatment is also that it decreases the viscosity of the glue produced with a given amount of water without detriment to its 'tack,' quick adhesive properties and cohesion" (R., 247, lines 84-92).

"However, great care must be taken not to have the heat sufficient or the acid in such quantity as to put the starch or carbohydrate in solution. If the action of the acid and heat is carried too far the starch will be changed into dextrin and will go into solution, and as such it would be lost to my process, as I utilize only the suspended material. Even this would cease to have the desired properties if the action were carried too far" (R., 248, lines 41-51).

The principle of the invention—the fundamental idea of means—is here made plain enough. Glue made by dissolving ordinary starch in an alkaline solution with three parts of water (the quantity to which the wood

working industry was accustomed) is too thick; and glue so made from over-degenerated starch is too weak. Between these two extremes there is a range of degeneration of starch at which, with that quantity of water there will be produced a glue of ample fluidity, without serious detriment to "tack", adhesiveness and cohesiveness. The essential thing was a particular degree of degeneration—not too much, not too little.

Such a quantitative idea of means lying at the foundation of an alleged invention requires under Sec. 4888, R. S., U. S. Code Tit. 35, Sec. 33, an explicit disclosure of the upper and lower limits of the range in order that the public may know how to practice the invention and may understand the metes and bounds of the patentee's monopoly.* This requirement of the law was recognized by the draftsman of the specification and he attempted to comply with it. After the issuance of the patent that attempt was found to be defective and the patent was reissued to cure the defect.

The patentee said in the specification of the patent as originally issued (R., 1188; patent, p. 3, lines 121 to p. 4, line 9):

> "One way which has been found quite satisfactory for determining when the action of the acid or its equivalent, and the agitation, have been carried far enough in the first step, is as follows:
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> When the carbohydrate glue base which has been dried has been boiled for ten minutes with dry live steam at 100 lbs. pressure with 9 parts of water and

*O'Reilly vs. Morse, 15 How., 62, 112; Cochrane vs. Badische, etc., Fabrik, 111 U. S., 293; Bene vs. Jeantet, 129 U. S., 683; The Incandescent Lamp Patent, 159 U. S., 465; Minerals Separation, Ltd., vs. Butte & Superior, etc., Co., 250 U. S., 336; Tyler vs. The City of Boston, 7 Wall., 327; and see in the lower courts: Matheson vs. Campbell, 78 Fed., 910, 917, 918 (C. C. A., 2) and American, etc., Co. vs. Mesta, etc., Co., 18 Fed. (2d), 538, 539 (C. C. A., 3).

tested for viscosity while hot, it showed a viscosity between that of cold water and three times that of cold water."

The Surrender and Reissue of the Original Patent.

After the issuance of the original patent, it was found that different viscosity measuring instruments gave different readings with the same substances or liquids, and, therefore, to accurately describe the test and give full information in reference to it, it became necessary to include in the specification a description of the particular form of viscosimeter to be employed. Without that the test was insufficient to identify the glue-base suitable to make the glue of the patent; and the original patent was, because of that deficient disclosure, found by plaintiff to be "inoperative or invalid by reason of a defective or insufficient specification" (Bill of Complaint, R., 4) and the patent was surrendered and reissued. In the reissue the omission was supplied by inserting the particular description of the "Perkins viscosimeter" and of the method of making the test, found in the reissue patent in lines 9-33 of page 4 (R., 250), beginning with the words, "In measuring this viscosity" and ending with the words "about 6½ seconds slower."

The specification of the reissued patent as thus corrected is an adequate disclosure within the requirements of Section 4888. It accurately marks the metes and bounds of the patentee's essential idea of means—the particular degree to which the water-absorptive properties of the starch must be reduced to serve as the glue-base of the patented glue.

This so-called 9:1 boil-up test, as thus amplified by amendment in the reissued patent, is an accurate scientific test, available in all cases and needing no further elucidation.

Starch lying within this range is, however, again described, with particular reference to the upper limit of permissible water-absorptiveness rather than with reference to the lower limit, on page 4, lines 74-81 of the patent (R., 250) as follows:

> "Also in actual practice I have found that a good glue is produced by treating the base with the chemicals to reduce the water absorbing power to a point where the base if mixed with two to three parts of water and subjected to heat of 170° F. would result in a syrupy condition instead of a thick jelly-like mass" (R., 250, lines 74-81).

It is admitted here that the untreated cassava starch used by defendant as a glue-base has a water-absorptiveness higher than the upper limit of the range measured by these tests of the patent. That alone, aside from all questions of prior art or disclaimer, is a complete defense under the authority of the cases cited in the footnote, page 21, *ante*. The rule of law is settled beyond dispute and the fact, although denied at the outset of the case at bar, is no longer denied (*post*, p. 26).

The Second Step of the Patent.

Having made clear the importance, to the final purpose of his invention, of procuring at the outset a glue-base, the water absorptive properties of which have been reduced to within the specified range, the patentee said (R., 248, lines 86-100):

> "The above forms the first part of my improved process and the various steps therein may all be carried out at the factory.
>
> In commercial use I preferably ship the dry material, obtained as above, to the consumer who car-

ries out the second part of the process at the place where the glue is to be used, but if desired the first and second parts of my improved process may be carried out together.

In carrying out the remaining steps in the preparation of my improved glue, the dried base, obtained as above, is mixed with about three parts or less by weight (of dried base) of water according to the strength of the joint and economy desired. The dried base does not materially go into solution in the water unless heat is applied, but a liquid suspension is thereby formed which is agitated and treated with a solvent of cellulose, as, for example, an aqueous solution of caustic soda or potash alkaline to phenolphthalein, using if cold from six to ten per cent. of the weight of the dry base, of caustic soda or its equivalent of caustic potash."

As the Court of Appeals said, in the *Solva case* (251 Fed., 72), "There was nothing new in the second step."

The Reference to Untreated Cassava Glue-Base in the Patent.

During the prosecution of the application, after the inventor died, his administratrix filed an amendment, without any supporting oath, inserting into the specification by amendment C of April 7, 1911 (R., 1095-1125), the words:

> "Thus, by proper adjustment of conditions of mixing I am able to produce this glue even with certain grades of untreated cassava carbohydrate and with other starches and conversion products (starchy carbohydrates)" (R., 1102).

This insertion is now made the basis for plaintiff's contention that the patent covers starch made from untreated cassava, even though that untreated cassava has high water-absorptive properties outside of the range measured by the tests of the patent.

If the "certain grades" referred to in this amendment to the specification, made after the inventor died and without supporting oath, included ordinary untreated cassava starch having water-absorptive properties which do not lie within the range measured by the tests of the patent, the amendment was a complete departure from the original disclosure; and, indeed, completely contradictory of the rest of the specification. It negatived everything the patentee had said about the necessity for, and the requisite degree of, preliminary degeneration of the starch.

So interpreted, the amendment would have been a radical change from, and an enlargement of, the disclosure of the patent and, being unsupported by an oath, would have been invalid.*

A more reasonable interpretation is that the patentee's administratrix, by this amendment, meant to say that there might be found in nature certain grades of cassava starch in which, by natural processes, the water-absorptive properties had been reduced to a point within the range of the patent disclosure, and that if so found, such grades of untreated cassava starch might be used for the purpose of his invention.

That is the interpretation put upon the language by plaintiff's attorneys, and expert, in the *Solva case*,** to

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*Railway Co. vs. Sayles, 97 U. S., 554, 564; Eagleton Mfg. Co. vs. West, etc., Mfg. Co., 111 U. S., 490; Steward vs. American Lava Co., 215 U. S., 161, 170; Michigan, etc., Co. vs. Consolidated, etc., Co., 67 Fed., 121.

** See fuller discussion of this matter, post, pages 73-78.

save the patent from invalidity because of this introduction of new matter without supporting oath. The Court of Appeals, accepting the interpretation plaintiff's counsel put on this sentence, said (251 Fed., 66):

> "While the added matters may in a sense be new, we do not regard them of so important a character as to constitute that class of new matter which would be invalid for want of an oath under the circumstances. They are related to the original purposes and objects set out in the original specification and claims, though some of them approach the border line."

(4) Defendant's Practice.

Defendant's glue base is a high grade cassava starch flour—G. T. A. brand or the equivalent G. T. G. brand (R., 48), just as it comes on the market, of high water-absorptiveness above the range measured by the tests of the patent. To make the glue (R., 25) 100 pounds of starch is mixed with 216½ pounds of water to make a milk of starch. The milk of starch is put into a stirring kettle provided with mechanical agitators and a steam-heating jacket. To the milk of starch is added 12½ pounds of caustic soda solution made by dissolving 4 pounds of caustic soda and 8½ pounds of water. In other words, defendant uses 2¼ parts of water to 1 part of starch, and substantially a 4 per cent. caustic solution.

Plaintiff's expert admitted at the trial of the case at bar that defendant's starch base did not have its water-absorptive properties reduced to within the range of the 9:1 boil-up test, but contended that it did lie within the 170° test, in the sense that the base, if mixed with two to three parts of water and subjected to heat of 170° F., would result in a syrupy condition instead of a thick jelly-like

mass (R., 35-36). But it was shown by the evidence that defendant's base, so treated, produced a thick, jelly-like mass, so that defendant's base was excluded from the patent even by this less precise test. That was the finding of the Master to whom the question was referred (R., 604), and it is no longer disputed.*

THE PRIOR LITIGATION AND THE REPRESENTATIONS ADVANCED BY PLAINTIFF THEREIN.

The force of the early litigation on this Perkins reissued patent can be properly estimated only when it is understood that when plaintiff first litigated its patent (in the *Solva case*)—where it was immediately confronted by the whole prior art and by the prior use at Poplar Bluff and had to measure the substance and scope of the patent against that prior art—it took the same position, with respect to the scope of the patent and with respect to the essential necessity of selecting a starch having water-absorptive properties reduced to within the range measured by the tests of the patent, that defendant takes now.

It may be admitted that the fact that plaintiff took that position then does not necessarily restrict it to that position now. The representations made to the Courts then are perhaps not of the nature of estoppels (although it is different with respect to the disclaimer hereinafter discussed). But as this Court said in *Minerals Separation* vs. *Butte & Superior* (250 U. S., 345), it is always difficult to recover the realities of a situation

*The Court of Appeals said, in the case at bar (R., 650):

> "It seems to be true that the 'raw starch' which defendant uses as the base of the process by which it makes its glue is not within the limits of inherent viscosity indicated by either of these operations."

long past and much litigated, such as this, and under such circumstances evidence derived from papers which were written, and from testimony given, before the particular now important aspect of the controversy arose, is especially impressive.

Solva Case.

In the year 1915 the first suit on the reissued patent No. 13,436, brought by Perkins Glue Company against Solva Waterproof Glue Co. and Thomas B. Kane and others, was tried before Judge Sanborn (223 Fed., 792), on claims 11, 13, 16, 19, 20, 24, 28, 30, 31, 32, 37 and 38 of the reissued patent, and claims 1, 2, 3, 6, 7 and 9 of a companion patent to Perkins (No. 1,020,656), called the "alkali patent" because it covered a process of degenerating the starch in the first step by the use of alkali and an oxidizing agent instead of acid as in the particular process of degeneration of the reissued patent 13,436.

Defendants used the alkali degenerating process of the Perkins second patent. Their base was degenerated to the extent of, and responded to the tests of, the reissued patent. The validity of the patent was attacked, and plaintiff distinguished from the Gerard and Dornemann patents and from the prior use of starch glue at Poplar Bluff by insisting upon the essential importance of the first step—producing or selecting a starch base having the specified reduced water-absorptive properties. So limited, the patent was sustained, all broader claims being held invalid.

Judge Sanborn, without any specific reference to the subject-matter of the several claims of the reissued patent, held both patents valid and infringed. On appeal (251 Fed., 64), his decision was reversed in part and affirmed in part. The Court of Appeals said (p. 66):

> "The gist of appellee's contention as stated by counsel is that Perkins discovered that there is a point of degeneration of starch at which, when degenerated to that degree, the starch is treated to not to exceed three parts of water and a solvent there is produced veneering glue as good as or better than animal glue, and that appellants have appropriated that discovery and the application of it."

and (p. 73):

> "All these, considered in connection with the presumption arising from the grant of the patent, lead us to hold, though with some hesitation, that the claims covering the finished glue product as well as the process claims for that article are valid and should be sustained."

It is clear that the claims for the "resultant product" were sustained (with hesitation and only because of the equities in favor of plaintiff) by reading into them from the specification and upon plaintiff's representation, the gist of the invention that distinguished Perkins' disclosure from the prior art—the choice of a starch having reduced water absorptive properties within the range measured by the tests of the patent.

It is plaintiff who is no longer satisfied with the *Solva* decision and goes by a roundabout way to overcome it. Among the defendants in the *Solva case* was Mr. Thomas B. Kane, who is the real defendant here. He was enjoined in that case and the injunction is still in effect. The Kane Mfg. Company, of which Mr. Kane is the principal owner and moving spirit, supplies to defendant here, Holland Furniture Company, the untreated cassava starch from which defendant makes the glue complained of; just as the Solva Glue Company furnished the degenerated starch to furniture makers in the *Solva*

case. Yet plaintiff has never attempted to enforce against Mr. Kane or the Kane Mfg. Company the injunction issued in the *Solva case.* The reason is that Mr. Kane and the Kane Mfg. Company have done what, in the *Solva case,* plaintiff said they had a right to do and what in that case the Court held was old in the art and outside the scope of the Perkins patent.

Although in the *Solva case,* District Judge Sanborn decreed validity of some claims that the Court of Appeals subsequently held invalid, yet the thing actually decided by Judge Sanborn was the same as the thing actually decided by the Court of Appeals.

Both Courts accepted plaintiff's contention that the gist of Perkins' invention lay in the discovery that there is a point (or range) of degeneration of starch such that when starch lying within that range is dissolved in three parts of water and an alkaline solution there will be produced a veneering glue as good as or better than animal glue.

In both courts the Gerard and Dornemann patents disclosing the making of glue from high viscosity untreated starch were laid aside on plaintiff's representation that such starch was not good for veneering and was outside the range of the patent.

Judge Sanborn held that the Gerson & Sachse patent disclosed the same chemical process of degeneration used by Perkins and the same degree of degeneration, so that he found the Perkins glue-base and the chemical process of making it to be old; but he found Perkins had exercised invention in applying the old base to a new purpose when he dissolved it in an alkaline solution with three parts of water to make a glue for wood veneering.

That finding leads logically to the conclusion that claims for glue made by dissolving a starch degenerated to that degree in three parts of water to make veneering glue are valid, and it did lead the Court of Appeals to that conclusion. But Judge Sanborn, apparently without recog-

nizing the logical inconsistency of so doing, held valid not only the claims for making a veneering glue by dissolving such a starch in an alkaline solution with such a quantity of water, but also the claims for the old glue base and the claims for the second step as such.

It was that inconsistency in Judge Sanborn's decree that was corrected by the Court of Appeals, which finally accepted, as Judge Sanborn had accepted, plaintiff's contention that Perkins was entitled to a patent for making a wood veneering glue by dissolving in an alkaline solution with three parts of water a starch having the reduced water absorptiveness particularly specified in the patent.

As to the state of the art, Judge Sanborn adopted the summary statement of defendant's counsel (235 Fed., 795), and in this he was followed by the Court of Appeals (251 Fed., 267). This summary statement does not, nor do the opinions, include any reference to the patents of Gerard, Dornemann or Marsden disclosing the manufacture of starch glue by dissolving untreated starch in caustic solutions. That is not because those patents were not brought to the attention of the Court, but because it was represented to the Court that being based on the use of an undegenerated starch, they were outside the scope of the patent and not anticipations.

That was so fully true—the making of glue from ordinary untreated starch as in the prior patents of Gerard and Dornemann was then so completely excluded by the plaintiff from the Perkins patent—that to illustrate the superiority of glue made from starch having low water-absorptive properties within the range of the first step of the patent, as contrasted with glues made with untreated starch of higher water absorptiveness, plaintiff's counsel brought into Court some ordinary untreated cassava starch and dissolved it with less than three parts of water. The heavy rubbery glue so produced from the untreated starch was pointed to as the product of the prior art and was differentiated from

the Perkins glue and the defendant's Solva glue, both of which were made from starch having reduced water-absorptive properties within the range measured by the tests of the patent. And in their brief in the Court of Appeals, counsel said (pp. 57-58; emphasis ours):

> "The Perkins second step was illustrated by tests in Court below by dissolving Perkins base and defendants' base in accordance therewith (pp. 152-158). To show *the effect of the first step,* the same second step was applied to some raw cassava, which had not been degenerated. The result was radically different, a rubbery, jellified product was produced, which it would have been impossible to run through pipes or to spread or to use for wood veneering (pp. 156-158, fols. 701-704). It was so tough and elastic that it tended to pull together and to regather into lumps when spread. It did not have the tack of the Perkins and Solva glues. It cohered more than it adhered; the two qualities (cohesion and adhesion) were not properly proportioned (p. 158, fol. 704). The inventor referred to this when he said (Re Pat. 13,436, p. 3, lines 84-89):
>
> > 'The preliminary treatment, however, substantially reduces the absorption of water by the starch and prevents it from becoming jelly-like and tough when afterward treated either with the water as above indicated or with the alkali.' "

It was thus, by insisting upon the essential principle and mode of operation explained in the patent—the necessity for reduction of the water-absorptive properties of the starch to within the range measured by the 9 to 1 boil up test and the 170° test of the patent, as a first step—that plaintiff differentiated the subject-matter of

its patent, in the *Solva* litigation, from the prior art high viscosity starch glue patents.

It was by the same differentiation that plaintiff saved its patent from invalidity by reason of the prior public use of starch glue at Poplar Bluff.

It pointed out that the glue base used at Poplar Bluff was not within the critical range of reduced water absorptiveness specified in the Perkins patent—that it was either too degenerated *or not degenerated far enough.*

In their brief before the Court of Appeals, at page 84, counsel said:

> "Throughout their brief, appellants [defendants there] assume that a starch degenerated to any point short of the soluble starch or dextrine stages falls within the range of degeneration specified by Perkins. *Such, however, is not the case. In this wide field Perkins found a certain point or range* such that if you degenerate the starch *to that point* and *then* treat it with a co-ordinated second step you will get the desired result." (Italics and explanatory phrase ours.)

Plaintiff there had to measure the glue of the Perkins patent against glue made at Poplar Bluff from identified shipments of starch, including shipments of raw cassava starch, and it differentiated the patented invention from these prior uses of raw cassava starch by in each case measuring the viscosity of the raw cassava starch by the 9 to 1 boil-up test of the patent, and pointing out in each case that so measured, the water-absorptiveness of the raw starch used at Poplar Bluff was higher than the upper limit of the range of the patent. Among the raw cassava starches there used and so measured was a shipment of G. T. A. brand of cassava starch, the very brand now used by defendant here (R., 756, 761).

Of these starch bases used at Poplar Bluff, plaintiff's counsel said (Brief, p. 117):

> "These starch bases, the products of the process above described, may be divided into two classes: (1) *those which comprised substantially raw starch, which had not been put through any converting process or first step,* these were perhaps what Mr. Perkins shipped as H or heavy body glue, because when mixed with 4 part of water (the amount used at Poplar Bluff) the mixture was too heavy and rubbery to use; and (2) those starch bases which were very much degenerated, which had been put through a very drastic converting action—these were perhaps what Mr. Perkins shipped as L or light body glue (possibly some H. M.), because, when mixed with 4 parts of water, the mixture was too thin and did not have sufficient body to use even on sugar barrel heads.
>
> Every one of these degenerating processes is different, and it requires only a brief consideration of them to see that each is different from the first step treatment outlined in the patents in suit. Not only do they differ from the first step treatment of the patents in suit, in kind and amounts of chemicals, temperature, length of treatment, etc., but in none of them is the conversion carried to just that point described by Perkins, where, when dissolved with about 3 parts or less of water and caustic, a glue having the essential qualities of animal glue for wood joints is produced,—*which point Perkins says is where the viscosity (by the test described in the Perkins patent) is about twice that of water.*" (Italics ours.)

The Poplar Bluff prior use was on plaintiff's own representations held not to be an anticipation of the Perkins patent, for the same reason that the Gerard and Dornemann patents were not anticipations of the Perkins patent. That is for the reason that the Perkins patent was limited to a particular degree of degeneration of the starch base, and excluded glue made from high water-absorptive starch by the application of the process of the second step; like defendant's glue here.

It was by accepting plaintiff's contentions in these regards that the Court was able to sustain those process claims of the patent which cover the combination of the two steps in related succession and those product claims which cover the final product of the two-step process.

And it was not by any indefinite quality of the final glue "as good as animal glue," that plaintiff there measured the range of water absorptiveness of the starch glue-base of the patent. They measured it then by the 9 to 1 boil-up test of the patent by which defendant insists it should be measured now.

The Final Decree in the Solva Case.

Plaintiff's patent then contained 38 claims divided into five groups: (1) claims on the process of making the glue base 1, 3, 4, 5, 6, 7 and 8; (2) claims on the glue base resulting from this preliminary treatment of the starch—24, 25, 26 and 27; (3) claims on the second or dissolving step—9, 10, 11, 12, 13, 14, 16 and 38; (4) claims on the whole process—the combination of the first and second steps—2, 15, 17, 18, 19, 20, 21, 22 and 23; (5) claims on the final glue product—28-37 inclusive.

The claims listed by Judge Sanborn at the outset of his opinion as those relied upon, included four (11, 13, 16 and 38) of the second step process claims; two (19

and 20) of the whole-two-step-process claims; one (24) of the claims on the glue base; and five (28, 30, 31, 32 and 37) of the claims on the final glue product. The first-step claims of the reissued patent were not sued upon, doubtless because defendant was directly infringing upon the "alkali" first step process claims of patent No. 1,020,656. In the decree Judge Sanborn held valid and infringed the second-step process claims 13, 16 and 38, the two-step process claim 19, the glue-base claim 24, and the final glue-product claim 28 (R., 355).

On appeal the Court of Appeals accepted, as Judge Sanborn did, the accuracy of defendant's view of the prior art (251 Fed., 67-68), and in the light of this state of the art and the disclosure of the patent held (1) that the Perkins first step was old; (2) that the glue-base product of the first step was old; (3) that the second step was old; and (4) "with some hesitation, that the claims covering the finished glue product, as well as the process claims for that article are valid and should be sustained."

And at the conclusion of the opinion the Court said (p. 74):

> "The decree of the District Court sustaining the claims for a glue base process and product and for the so-called second step as such is reversed, and that part of it which upholds the claims of the patents for the final process and the resultant product respectively is affirmed, with direction to the District Court to proceed further in accordance herewith."

The opinion did not refer to the claims of the patent by number. The only claims specifically mentioned in the opinion were two claims from the second Perkins patent,—the so-called alkali process of practising the first step.

It remained to prepare a decree. It had to be determined what claims of the reissued patent were invalid and what claims were valid.

The defendant seized upon the fact that the only claims quoted were claims 7 and 9 of the second patent, and being moved to action by a circular published by the plaintiff company, which, as defendant thought, misrepresented the decision of the Court, filed a petition for rehearing saying that (R., 347):

> "* * * it is our understanding that the final process to which reference is here made is the complete refined process as finally adopted and described in claims 7 and 9 quoted in the opinion. * * *"

The defendant there was seeking to limit the patent to the particular *process* of degeneration—using sodium peroxide and caustic soda in the first step—defined in the second Perkins patent. That extreme limitation was certainly not supported by the opinion of the Court, which had found in effect that what Perkins discovered was that there exists a point (range) of degeneration of starch at which when dissolved in three parts of water and alkali there will be produced a glue having the properties and physical characteristics of animal glue.

Plaintiff's counsel filed a reply to the petition for rehearing and it may be assumed that they contended for the broadest interpretation of the patent to which they could conceivably be entitled. They must have weighed the matter with great care in the long litigation and they must have been convinced that the time had come when they should assert their rights fully and to the extreme limit of what they were entitled to.

In defining the Perkins invention and interpreting the finding of this Court at that critical juncture they said (R., 351):

"The opinion makes it clear that Perkins discovered that a starch *previously suitably degenerated* could be *subsequently* dissolved with a solvent of starch and three parts or less of water and *make the glue the patents describe,* and that that constituted a proper basis for process and *product* claims, the process requiring both the previous degeneration and subsequent dissolving operation *and the product being the resulting* 'starch glue as good as animal glue and suitable for veneering.' " (Italics ours.)

The only final product claim brought to the attention of the Court by the petition for rehearing was claim 28 which defined the final product as "a glue comprising cassava carbohydrate rendered semi-fluid by digestion and having substantially the properties of animal glue." Of this final product claim the plaintiff said (R., 352):

"But claim 28 is one of the claims of the first and broader acid patent, reissue No. 13,436, and, of course, covers glue *made from starch degenerated* by the acid process as well as by the alkali process." (Italics ours.)

And in conclusion they said (R., 353):

"The opinion points out in the middle of page 6 that the glue base of the patents may be obtained in a variety of ways. Such a base and the process of making it, after being given a broad construction by the Court, is found to be old, and the Court also says the second step is not new or patentable, 'as such'; but *the combination of the two operations in related succession to produce the good-as-animal glue suitable for veneering the Court finds to be new and patentable* as a process, and the *resulting* finished

glue the Court finds to be new and patentable as a product.

As the opinion plainly indicates, *the final glue product* may be made by *suitably* treating a *suitable* base, whether *previously degenerated* by the alkali treatment or by the acid treatment, or obtained by intermixture or simply found in the market—*provided only that that base is in the proper state or condition of degeneration* when treated to make this *final glue product.*

The Court evidently felt that the 'second step alone' or the 'second step as such' might produce other products than the 'starch glue as good as animal glue and suitable for veneering' covered by claim 28 and others (*as if, for example, applied to the under-degenerated starch, such as raw starch,** or to an overdegenerated starch, such as dextrine) and therefore held that the claims for the 'second step as such' were invalid. But the Court makes it clear that the patent covers *the product of the second step when the second step is applied to a base previously suitably converted by an earlier operation to the proper slight degree of degeneration* to produce in the end the starch glue as good as animal glue and suitable for veneering." (Italics ours.)

This was, in our opinion, a fair interpretation of the opinion of the Court and no words could be better chosen than were the words of plaintiff's counsel at that critical time, to express the fact that the product claims did not cover the application of the second step to ordinary untreated starch having water-absorptiveness above the range measured by the tests of the patent.

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*The thing charged to be an infringement in the cases at bar is, of course, the product produced by applying "the second step alone" to "under-degenerated * * * raw starch."

The Court denied the motion for a rehearing and the parties went before Judge Sanborn in the District Court with conflicting contentions as to the proper form of the final decree.

Judge Sanborn said, after discussing the opinion of the Court of Appeals:

> "From these quotations it seems probable that the Appellate Court intended to sustain only those claims of the patent which include only the two steps, and only when their use results in the Perkins glue *together with those additional claims which count on such glue as a product of the two steps,* and no others." (Italics ours.)

When the conclusion arrived at by Judge Sanborn was applied to the claims in the patent, plaintiff and defendant did not agree.

Plaintiff as we have seen, contended that the Court of Appeals had held that the " 'starch glue as good as animal glue and suitable for veneering' covered by claim 28 and others" excluded a glue produced by applying the second step to "under degenerated starch, such as raw starch"; and the three product claims here in suit were held to be valid with that interpretation, expressed by Judge Sanborn in the words:

> "The Appellate Court intended to sustain only those [product] claims of the patent * * * which count on such glue as a product of the two steps."

Among the claims that Judge Sanborn felt to be invalidated by the decision of the Court of Appeals were the so-called "second step" claims (Nos. 9, 10, 11, 12, 13, 14 and 38). Plaintiff urged that these claims also should be held valid by limiting them to the application of the second or dissolving step to starch previously degener-

ated to the extent described in the patent. But Judge Sanborn thought that this could not be done in view of the fact that the second step as such had been found to be old and the Court of Appeals had said that "The decree of the District Court sustaining the claims * * * for the so-called second step as such is reversed" (R., 360) and he held these claims invalid.

Plaintiff Acquiesced.

Plaintiff immediately accepted that decision. The monopoly left to plaintiff was of great value and plaintiff proceeded to consolidate and enforce it.

The decision of Judge Sanborn was in fact in close accord with what plaintiff had asked for. It excluded from the patent the application of the second-step to raw starch on the one hand and to dextrine on the other, and properly limited the patent to a glue made by dissolving in an alkaline solution, with not more than three parts of water, a starch having reduced water-absorptiveness within the range measured by the tests of the patent.

Plaintiff's own presentation to the Court of Appeals and to Judge Sanborn precluded any broader interpretation of the product claims than Judge Sanborn gave to them.

The Disclaimer.

Thereupon plaintiff entered a disclaimer eliminating from the patent all of the first step claims and the glue-base claims, but preserving in part the "second step" claims by expressly limiting them to the making of glue by applying the second or dissolving step to starch already degenerated to the extent described in the patent.

This disclaimer executed as of January 30, 1919, by the plaintiff company, assignee of the patentee, included the following language:

"That by the record and decisions in the United States District Court for the Northern District of Illinois, Eastern Division, and in the United States Circuit Court of Appeals for the Seventh Circuit, in the case in which your petitioner was plaintiff and appellee and Solva Waterproof Glue Company and others were defendants and appellants, your petitioner is advised that the said Reissued Letters Patent No. 13,436, in so far as concerns claims 1, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 24, 25, 26, 27 and 38 thereof, *covers and includes more than the said inventor had a right to claim as new.*

"That the subject matter not herein and hereby disclaimed is definitely distinguishable from the part or parts disclaimed herein, and is truly and justly the invention of the said Frank G. Perkins, and is a material and substantial part of the thing patented.

"Your petitioner, therefore, for the purpose of complying with the requirements of the law in such case made and provided, and of disclaiming those parts of the thing patented which your petitioner does not choose to claim or hold by virtue of said Reissued Letters Patent No. 13,436, hereby enters its disclaimer of claims 1, 3, 4, 6, 7, 8, 16, 24, 25, 26 and 27 thereof (to wit: the claims for the glue base *per se* and for the process of making the glue base *per se*) *and further your petitioner hereby disclaims from claims* 9, 10, 11, 12, 13, 14 and 38, *of said Reissued Letters Patent No.* 13,436 *any process of making glue, excepting where the starch or starchy product or carbohydrate subjected to the process, is degenerated to the extent described in the said Reissued Letters Patent No.* 13,436, whereby the process results in the good as animal glue described in said Reissued Letters Patent No. 13,436."

(We have emphasized the portion of the disclaimer in which the plaintiff disclaimed the thing the defendant here uses.)

Of this disclaimer plaintiff says in paragraph 7 in the bills of complaint in the case at bar (R., 5).

"7. That thereupon, having reason to believe that through inadvertence, accident or mistake certain claims of said Letters Patent were *too broad, including that of which the applicant for said Letters Patent was not the first inventor,* plaintiff duly entered in the United States Patent Office, on or about the 6th day of February, 1919, its disclaimer of claims 1, 3, 4, 6, 7, 8, 16, 24, 25, 26 and 27 of said Letters Patent (to wit: the claims for the glue base *per se* and for the process of making the glue base *per se*); and also disclaimed from claims 9, 10, 11, 12, 13, 14 and 38 of said Letters Patent, *any process of making glue, excepting where the starch or starchy product or carbohydrate subjected to the process, is degenerated to the extent described in said Letters Patent,* whereby the process results in the good as animal glue described in said Letters Patent, a duly certified copy of which disclaimer is now ready to be produced in Court." (Italics ours.)

This disclaimer was filed under the provisions of Sections 4917 and 4922 of the Revised Statutes (U. S. Code, Tit. 35, Sec. 65 and Sec. 71) which provide that where a patentee has claimed "more than that of which he was the original or first inventor or discoverer" he may, if he wants to (Sec. 4917), and must, if he desires to "maintain a suit at law or in equity for the infringement of any part thereof which was *bona fide* his own" disclaim such parts of the thing patented as

he shall not choose to claim or to hold by virtue of the patent, provided that what remains "is a material or substantial part of the thing patented" (Sec. 4917), and "definitely distinguishable from the parts claimed without right" (Sec. 4922).

Both sections of the statute have reference to a case in which a patentee, through inadvertence, accident or mistake, and without any fraudulent intent, has claimed more than he was entitled to, and where the part which is *bona fide* his own is clearly distinguishable from the part claimed without right. They apply only when such a clear distinction exists.*

The patent, in these so-called "second step" claims, had been held to claim more than the patentee was entitled to. To maintain a suit at law or in equity for infringement of that part of the invention which was *bona fide* its own plaintiff was required to make, in good faith and without intent to defraud or mislead the public, its disclaimer; and to show that what remained within the monopoly of the patent after the disclaimer was definitely distinguishable from what had been claimed without right.

The thing disclaimed was definite enough. The disclaimed "second-step" claims are printed in the margin.**

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*Hailes vs. Albany Stove Co., 123 U. S., 582, 588.

**9. The process of making glue which consists in treating starch below the bursting temperature of the starch, with a digesting agent such as caustic and water until the material assumes a viscous semi-fluid consistency adapted to be applied by machinery.

10. The process of making glue which consists in dissolving cassava carbohydrate in caustic alkali until a glue is formed as distinguished from mucilage, sizes and pastes.

11. The process of making a glue, which consists in treating a starchy carbohydrate with caustic alkali, and water, to dis-

(Footnote continued on next page.)

Each of them covers the making of glue having qualities suiting it for use as a good veneering glue by dissolving starch in a solution of caustic alkali, and particularly with "about three parts or less by weight of water" (Claims 11, 12, 13, 14 and 38).

In some of the claims (11, 14 and 38), the proportion of alkali used is emphasized. In claim 9 treatment is to be conducted "below the bursting temperature of the starch," and in claim 13 a "suitable" starch is to be chosen "a material portion of which is substantially

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solve the carbohydrate, the total amount of water used being about 3 parts or less by weight of the carbohydrate, the amount of caustic alkali used, calculated as NaOH being about 10% or less by weight of the carbohydrate so that a wood glue is formed, as distinguished from mucilages, sizes and paste.

12. The process of making a glue, which consists in mixing starch with water and caustic alkali to dissolve the carbodrate, the amount of water used being about 3 parts or less by weight of dry carbohydrate so that a wood glue is formed, as distinguished from mucilages, sizes and paste.

13. The process of making a wood glue which consists in treating a suitable starchy product a material portion of which is substantially insoluble in water with a solvent of cellulose and about 3 parts or less by weight of water, to produce a glue having adhesive powers substantially as great as those of good animal glue.

14. In the making of glue, treating a suitable starchy product with about three parts or less by weight of water and adding a solution of caustic soda or other equivalent alkali using about 10% or less by weight of the caustic soda or its equivalent of other alkali to dissolve the product.

38. The process of making a wood glue which consists in suspending a glue base containing amylaceous matter insoluble in water in about three parts or less by weight of water and treating the base with an alkali properly proportioned substantially as described to produce a glue having a lasting viscosity to flow through pipes and the adhesiveness of animal glue.

insoluble in water," and in claim 38 the glue-base is to be a starch "containing amylaceous matter insoluble in water." But these distinctions did not save the claims from invalidity.

The use of three parts or less by weight of water would not produce the Perkins glue with all starches, but only with starches having water-absorptiveness within the specified range. Above that range the resulting glue would not be the Perkins glue because it would be too thick, jellylike and tough, and below that range it would be too thin and weak.

The dissolving of starch in alkaline solutions to make glues in the prior art was commonly conducted below the bursting temperature of the starch.

Specifying that a material portion of the starch is substantially insoluble in water distinguished only from the soluble starches. It excluded starches below the lower limit, but did not exclude starches above the upper limit.

So these claims were not limited to the selection of a starch within the Perkins range, and, therefore, did not define the Perkins invention. Plaintiff had urged that the Court should read into these claims from the specification—because of the adjective phrases they contain such as "to produce a glue having adhesive power substantially as great as those of good animal glue" (claim 13); or "to produce a glue having a lasting viscosity to flow through pipes and the adhesiveness of animal glue" (claim 38)—a limitation to the making of glue from starch having water-absorptive properties reduced to within the range described in the patent. But the Court declined to do that and so plaintiff proceeded to do it by disclaimer with limitations.

It disclaimed the making of glue from starch by dissolving it in an alkaline solution with three parts or less by weight of water except only when the starch, chosen as the glue-base, is "degenerated to the extent described in said Reissued Letters Patent No. 13,436."

Plaintiff is, of course, bound by the disclaimer and cannot now reclaim anything it then disclaimed.*

But it is now admitted that defendant's procedure here does not fall within that exception. Defendant here makes its glue not from a starch degenerated to the extent described in the patent, but from a starch having high water-absorptiveness above the range described in the patent.

For its starting material, defendant has chosen the ordinary commercial untreated cassava starch having water-absorptive properties higher than the upper limit of the range measured by the tests of the Perkins patent, and therefrom it has made a very heavy, viscous and ropy glue by continued and violent agitation in power mixing machines, and it has succeeded in using that heavy glue in wood-veneering despite the fact that it has not the ample fluidity of the Perkins glue.

In doing this it has not followed Perkins. It has accepted the thing that Perkins rejected after his experience at Poplar Bluff; excluded by the language of his patent specification; differentiated from in the *Solva* litigation to save his claims from anticipation by the prior art, and by the Poplar Bluff use; and disclaimed at the end of the *Solva* litigation so that he might proceed to enforce claims covering his real invention.

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*Dunbar vs. Meyers, 94 U. S., 187, 193; Atlantic, etc., Co. vs. Hulings, 21 Fed., 519, 520; Bracewell vs. Passaic Print Works, 107 Fed., 469.

Further Enforcements of Plaintiff's Patent Rights.

The Hood-Wright and West Michigan Cases.

Having thus consolidated its position and with a patent that still covered all that Perkins or the plaintiff had up to that time asserted that Perkins was the inventor of—glue made by (1) selecting as the glue-base a starch having water-absorptive properties within the defined range and (2) dissolving that starch in an alkaline solution with three parts of water,—plaintiff brought suit against *Hood-Wright* and the *West Michigan Furniture Co.* of Grand Rapids. These cases were decided in favor of the plaintiff in September, 1920, by Judge Sessions (279 Fed., 454).

The claims there involved were the second-step claims 13 and 38, and the product claims 28, 30 and 31.

The infringement there complained of is defined in Judge Sessions' opinion in the following words (p. 455):

> "The glue base manufactured and sold by the National and International Process Companies and used by defendants is not prepared in accordance with the method or first step of the process of the patent but is produced by mixing commercial starches of different grades and kinds, *the raw, under degenerated and over degenerated starches being so proportioned that the mixture has the same average degeneration and the same water-absorptive properties as the processed glue base of the patent.*" (Emphasis ours.)

The effect of the decision was that these claims are not limited to that particular chemical process of degeneration by acid treatment described in the reissued patent. The "second-step" claims 13 and 38 are infringed by choosing as a glue-base a starch having the same water-absorptive properties as the glue-base of the pat-

ent, and dissolving that starch in an alkaline solution with three parts or less by weight of water; and the product claims 28, 30 and 31 are infringed by a glue so made.

That was the interpretation put upon the claims by the plaintiff in the *Hood-Wright* and *West Michigan* cases, and if plaintiff is held here to the position it took there, the decision in the District Court in the case at bar will be affirmed and the decision of the Court of Appeals will be reversed.

Judge Sessions based his decision upon the Court of Appeals' decision in the *Solva case*. Of the statement in the patent specification that certain grades of untreated cassava starch might be used as the glue-base of the patent, Judge Sessions said (p. 456):

> "In his specification, the patentee points out, or at least suggests, that his glue base may be produced without using his preferred process. It must follow that the claims for the inventor's final process, applied to or in combination with *the glue base of the patent*, in whatever *manner* such base may have been produced, are valid. That the Court of Appeals intended so to hold seems reasonably probable."* (Italics ours.)

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*In the Hood-Wright and West Michigan cases, as in the Solva case, plaintiff and its expert, Dr. Grosvenor, interpreted this statement, that certain grades of untreated cassava starch might be used, as meaning that starches of the reduced water-absorptiveness essential to the Perkins patented glue might occur in nature, and that when the chemist was once instructed what that essential range of water-absorptiveness was and how to measure it, he could then select from such low water-absorptive starches on the market a starch suitable for use as the Perkins glue base. And Dr. Grosvenor's testimony to that effect as given in the West Michigan case is stipulated into the record here (See R., 121, 124 and 125-126).

Of the "second step" claims 13 and 38, he said (p. 456):

> "These claims are not strictly for the second step of the process alone and as such, but are for the final process, applied to or in combination with the glue base of the patent. Such a construction avoids inconsistency and satisfies the mandate of the court in both letter and spirit."

Of the disclaimer, he said (pp. 456-457):

> "Of course, the plaintiff is bound by its disclaimer, but the limitation thereby imposed does not extend beyond the plain meaning of the language employed and the purpose sought to be accomplished. The sole object of the disclaimer was to narrow the claims with respect to the starchy product or glue base to be subjected to the final process of the patent. Under the disclaimer the starch or starchy product to be processed must be degenerated to the extent described in the patent before being subjected to the final process of the patent. So limited, the claims are valid and infringed."**

The Case at Bar in the District Court.

The next case to come before the Court, and the first one in which the glue-base involved was the high water-absorptive untreated starch sold by the Kane Manufacturing Company, is the case at bar, which was tried before Judge Sessions in 1921 and decided by him on July 8th of that year (279 Fed., 457).

The claims originally declared on were the "second-step" claims 13 and 38 and the glue product claims 28, 30 and 31.

**That conclusion also is in strict accordance with the stand taken by plaintiff's counsel and expert in the West Michigan case and carried into the case at bar by the testimony of Dr. Grosvenor, stipulated from the West Michigan case (See R., 119-120 and 130).

In addition to the untreated Kane base which finally became and now is the sole subject of controversy in the case at bar, there was also involved at the trial of the case the use by defendant of some mixed starch of low water-absorptiveness furnished by the Solva Waterproof Glue Co. and by the International Process Co. of the same character as that adjudicated in the *Hood-Wright* and *West Michigan* cases. The making of glue from that Solva glue-base and International Process glue-base was within the scope of both the second step claims and the glue product claims since those starches had low water-absorptiveness within the range measured by the tests of the Perkins patent. In the final decree (R., 637) it was so adjudicated. Defendant did not appeal from that adjudication and the consideration of those glue-bases dropped out of the case.

At the trial, plaintiff's expert admitted that the Kane base did not respond to the 9 to 1 boil-up test, but took the position that it was within the range of the Perkins patent as measured by the 170° test (R., 35) and this evidence as to the degree of degeneration of the Kane base was then accepted by Judge Sessions, who said (279 Fed., 457):

> "In the present case, a part of the glue base used by defendants has been produced in the same way and by the same manufacturer [as in the *Hood-Wright and West Michigan* cases]; but another part has been produced by another manufacturer, by selecting a single grade and quality of commercial cassava starch and merely sifting out the impurities therein contained. *Manifestly the resultant glue base is the same, whether consisting of a mixture of starches of different degrees of degeneration or of a single starch of the same degree of degeneration as the mixture.*" (Emphasis ours.)

To this holding Judge Sessions added that plaintiff's expert had testified (p. 458):

> "that the starch * * * has been degenerated as required in the process claims of the patent. Testimony based upon an analysis of a single sample is not entirely satisfactory, and ought not to be accepted as conclusive. If defendants' glue base consists of a starch which has been degenerated as described in the patent, the process claims declared upon are infringed. On the other hand, if the starch base has not been so degenerated, the process claims are not infringed. Further proof upon this question may be taken by either party upon the accounting."

Having found (erroneously as it turned out) that the Kane base had the same degree of degeneration as the mixture of starches in the *Hood-Wright* and *West Michigan* cases, Judge Sessions' uncertainty as to whether or not the starch "has been degenerated as required in the process claims of the patent" and "has been degenerated as described in the patent" can be understood only as contemplating a *process* of degeneration as distinguished from a *degree* of degeneration, or so it seems to us. At any rate, Judge Sessions did not hold that either the "second-step" claims or the product claims were infringed by a glue made from starch which *did not* have the degree of degeneration specified in the patent. At most, he accepted the contention of plaintiff's expert that the 9 to 1 boil-up test did not apply, but the 170° test did.

In accordance with his instructions testimony was taken on the accounting as to the degree of degeneration of the Kane base, and the Master found that it was not degenerated to the degree measured either by the 9 to 1 boil-up test or by the 170° test (R., 604) and, thereupon, and after the decisions of the Court of Appeals of the Second Circuit in the *Standard Furniture case*

and the Court of Appeals of the Seventh Circuit in the *Gould Mfg. Co. and Wisconsin Chair cases,* Judge Sessions entered a final decree holding that neither the "second step" claims nor the product claims were infringed by the Kane base (R., 637).

The Standard Case in the Second Circuit.

The next case to be tried was the *Standard Furniture case,* before Judge Cooper in the Northern District of New York in 1922. The base there involved was Viscamite, an untreated cassava starch supplied by the Bloede Company of Baltimore.

The claims relied on were the second-step claims 13 and 38 and the product claims 28, 30 and 31.

There again there was conflict of evidence as to the degree of degeneration of the base. The Court recognized that the Perkins discovery depended upon a particular range of degeneration of the glue-base (279 Fed., 459); that the Court of Appeals in the *Solva case* had held claims 13 and 38 invalid because they did not exclude what was old in the art (p. 460); that the disclaimer excluded from the patent any process of making glue excepting where the starch or starchy carbohydrate subjected to the process is degenerated to the extent described in the patent (p. 460); that Judge Sessions, in the *Hood-Wright* and *West Michigan* cases had held claims 13 and 38 "as limited by the disclaimer" to be valid and infringed (p. 460); and Judge Cooper adopted that view (p. 460).

On the question of infringement Judge Cooper said that the Court of Appeals in the *Solva case* had held the patent infringed by a glue made from starch "degenerated to a stage equivalent to that produced by Perkins first step" (p. 462). The evidence as to the degree of degeneration of defendant's base was discussed at some length (p. 463). It did not seem to Judge Cooper

sufficient to show that defendant's base was not degenerated to the extent specified in the patent, and he said (p. 464):

> "It is manifest that, where the raw starch is procured on the market, already sufficiently degenerated, so as not to require the chemical treatment of the first step of the Perkins patent, or where commercial starches of different grades and kinds may be mixed mechanically to produce the required degree of degeneration, the defendants cannot with impunity use such base, together with the other step of the Perkins process, and obtain the Perkins glue. This was in substance the holding in the Illinois and Michigan cases."

Defendant here has no occasion to question the correctness of the foregoing statement by Judge Cooper, but he finally went on to hold that:

> "Where the Perkins glue, as described in the product claims (28, 30, 31), or its equivalent, is in fact obtained as described in those claims, those claims are infringed, regardless of the degree of degeneration of the base. The question of degree of degeneration or viscosity of the base is material only to the process claims (13 and 38) affected by the disclaimer. The Perkins patent has been infringed by the defendant corporation."

It was this holding that was reversed by the Court of Appeals of the Second Circuit in January, 1923 (287 Fed., 109).

The Gould-Wisconsin Chair Cases in the Seventh Circuit.

In point of time, the next case to come before the Courts was the *Gould Manufacturing and Wisconsin Chair cases,* tried before Judge Geiger in May, 1922. There the infringement complained of was the use of

the same Kane base that is involved here. For the first time it was there definitely proved, and plaintiff was forced to admit, that the untreated cassava starch sold by the Kane Manufacturing Co. as a glue-base does not in fact respond to any tests of the Perkins patent in suit, and is not in fact a starch having water-absorptive properties within the range measured by those tests. The issues were greatly simplified and clarified by this elimination of all controversy and pretense as to whether or not the Kane base does respond to the tests of the patent, and Judge Geiger held that under those circumstances there was no infringement of the product claims 28, 30 and 31 which were the only claims there in issue, as they are now the only claims in issue in the case at bar.

Judge Geiger's opinion is a condensed and lucid statement of the whole essence of the controversy, and it seems to us that the conclusion there arrived at is unassailable.

It was affirmed by the Court of Appeals of the Seventh Circuit in June, 1923 (292 Fed., 596). The Court said (p. 597):

> "Following the final decree of Judge Sanborn, appellant filed in the Patent Office a disclaimer of all the claims for the glue base and all the claims for the process of making the glue base; and appellant further disclaimed 'from claims 9, 10, 11, 12, 13, 14 and 38,' which cover the second process, 'any process of making glue excepting where the starch or starchy product or carbohydrate subjected to the process is degenerated,' by use of the first process, 'to the extent described in the said patent.' In our judgment this disclaimer is a conclusive bar to appellant's attempt to monopolize a product, which does not depend at all for its existence upon the use of appellant's valid process claims.

In addition to the foregoing reasons, we may say that our view of the prior art leads us to the conclusion that the only patentably novel thing that could be attributed to Perkins' labors was the combination of two processes which severally were old, and that no product claims could validly be given a broader sweep of monopoly than inheres in the combined processes."

The Opinion of the Court of Appeals in the Case at Bar (R., 645).

The opinion of the Court of Appeals opens with a discussion of the commercial success of the Perkins glue.* It is true that Perkins introduced starch glue into the veneer industry in this country. By selecting as a glue base a starch having its water absorptiveness reduced to within the range defined in his patent—far enough to get ample fluidity for easy application and not so far as to substantially impair the strength of the glue—he produced a vegetable glue that paralleled the animal glue solutions then employed in the veneering industry in respect to water content and physical properties in application, and equalled them in strength and permanency. It was for this achievement that his patent was granted. By an intensive campaign of salesmanship he overcame the reluctance of veneer makers to depart from animal glue to which they were accus-

*We cannot understand the Court's statement (R., 646), "It was known (though very likely not to Perkins) that this inherent degree of water-absorptiveness could be lessened by artificial treatment, called degeneration," because it is clear that Perkins, like everyone else, in the art, knew that and had practiced it for years in connection with the glue bases he supplied to the Brooklyn Cooperage Company at Poplar Bluff.

tomed (R., 750, 751, 797) and when the war raised the price of animal glue to a prohibitive figure for veneering (R., 405, 412), the Perkins vegetable glue was widely adopted in the veneering industry. It has never found any substantial application in wood joint work (R., 142, 144, 225). It was because of the commercial success of his glue in veneering that the patent was sustained in the *Solva case,* in spite of the fact that the art already knew how to make from starch glue-bases of all degrees of water-absorptiveness, including the very degree chosen by Perkins.

The Court of Appeals in the case at bar defined Perkins' invention as follows (R., 646):

> "Perkins lessened the capacity of the starch molecules for water absorption, but was careful not to carry the treatment far enough to change the water into dextrine or to dissolve it, which, with the subsequent treatment, would have produced paste, mucilage, or sizing."*

Following this the Court adds (R., 646-647):

> "Because the starch water-absorbing capacity had become relatively small, a small amount of water would make a fluid mixture, so that it could be properly applied, and yet the necessary tenacity would remain."

These statements are a fair enough definition of what Perkins did.

But the Court, saying that the "second step" treatment was also broadly well known, added that by it, "the pri-

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*It is a mistake to use the word "sizing" as an antonym for the words "paste" and "mucilage." Starch glues of all strengths were used for sizing. That word does not define a thing; it defines the use of a thing.

mary starch and water mixture was converted into a new compound, which had customarily been one of those weaker adhesives, and which, by Perkins' treatment, became glue."

That is true only when the over-degenerated starches are used, not when the under-degenerated starches are used with violent agitation, as in the Gerard and Dornemann patents.

The Court then (R., 647) selects claim 30 as typical and bases its subsequent discussion on that claim. Then (R., 648) the Court says:

> "The defense primarily urged is that the specified process or processes must be so far implied in the claim that defendant does not infringe."

This is a complete misunderstanding of defendant's position there and here.

Defendant here does not contend, as was contended by the defendants in the *Solva* and *Hood-Wright* and *West Michigan cases,* that the specified *process* of degeneration of the Perkins patent must be implied in the product claims. Defendant here recognizes the general rule, referred to by the Court of Appeals, that normally a new process and a new product are separate and independent things and that it is an exceptional case when process and product are necessarily inherent and inseparable "like the two sides of a sheet of paper."

But the product claims and the disclaimed "second step" claims of the Perkins patent are of that exceptional character,* if, indeed, it can be properly said that

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*Giant Powder Co. vs. California Powder Works, 98 U. S., 126; Packing Co. cases, 105 U. S., 566; Western Electric Co. vs. Ansonia, 114 U. S., 447.

the disclaimed "second step" claims were process claims at all.

The invention, even as defined by the Court of Appeals, lay in the selection of a particular kind of starch as the starting material—glue-base—and the treatment of that with a particular amount of water to make a veneer glue.

The defect in the "second step" claims as they stood in the original patent was that, although they defined the particular quantity of water they did not limit the selection to the particular kind of starch, chosen as the glue-base. They were broad enough to cover the making of glue by the application of the "second step" to any starch. For that reason, they were anticipated by the prior patents and by the prior use at Poplar Bluff, and failed to define the very thing that plaintiff insisted was the gist of the invention. To make them define the gist of the invention plaintiff disclaimed from them the application of the "second step" to any starch except when the water-absorptiveness of starch had been reduced to within the stated range.

Before the disclaimer, and as a result of plaintiff's own presentation of the invention in the *Solva case*, the product claims had been sustained only by limiting them to the glue product which results when such a selected starch is dissolved in an alkaline solution with three parts or less of water.

Between *the making of glue* by selecting such a starch for the glue-base and then dissolving it in an alkaline solution with 3 parts of water, and *a glue made* by dissolving such a selected glue-base in an alkaline solution with 3 parts of water there is no difference; no more difference than between the two sides of a sheet of paper or between a shadow and the body that produces it (98 U. S., 137). That is very well illustrated by referring

to plaintiff's interrogatories in this case (R., 17) where the only language in which plaintiff could ask defendant whether it had infringed the patent was such as this (Interrogatory 3):

> "3. Has the defendant company in the year 1919 or the year 1920 made vegetable glue by dissolving vegetable glue material (not purchased or obtained from plaintiff, Perkins Glue Company) with three parts or less of water and less than 10% of caustic soda to produce a vegetable glue and used it for glueing together veneered stock for furniture panels?"

It is confusing and misleading to refer to the procedure of the "second step" claims as a process. To do so implies that there was inherent in these claims some *particular process* of degeneration or some particular *process of mixing,* or both. The fact is that in these claims, as they originally stood, there was only implied a choice of a *quantity of water,* and in these claims, as amended by the disclaimer, there was implied a choice of a grade or *quality* of starch and a choice of a *quantity* of water.

The result of the disclaimer was to exclude from the patent starch made with the chosen *quantity* of water unless there was also used in making it the chosen *quality* of starch.

Defendant makes glue with that chosen quantity of water, to be sure, but not with that chosen quality of starch, and it is, therefore, operating within the disclaimed field. It is without sensible meaning, we think, to say that in so doing defendant, nevertheless, infringes the product claims and so cannot use the glue so made without paying tribute to plaintiff.

The fact that in general a product and the process of making it are separate and independent things has nothing to do, we think, with the present discussion.

There is no reason to take any exception to the remark of the Court of Appeals (R., 648) that in the product claim 30, there is "a suggestion of reference to method, but only a suggestion; the substantial reference is to the constituents which make up the finished product, and is without dependence on the method by which they are combined."

It is because defendant does not use the constituent glue-base that characterized the broadest aspect of Perkins' invention that it does not infringe.

It is in the next paragraph of the opinion of the Court of Appeals (beginning "We understand defendant to contend * * *" R., 649) that the vital error lies. Defendant does contend that to save claim 30 from anticipation, and to infringe that claim, we must start with a glue-base having water-absorptiveness within the range specified by Perkins.*

The Court of Appeals went on to say:

> "* * * Not to save from anticipation, but to make operative and intelligible, there is an implied limitation to that base which, when combined as stated, will give the result stated. In other words, out of the variety of starch carbohydrates we must select one suitable for this combination. In this there is no forbidden vagueness, for the specification teaches that starch is suitable when its water-absorbing capacity is not too high nor too low, but is in what we may call for convenience the medium range. It cannot be said that Perkins put any absolute limits

*If that character of starch is what the Court meant "by the product of the first step," we agree with the Court's statement of defendant's contention in the first sentence of that paragraph (R., 649). But if the Court meant by the words "the product of the first step," the product produced by the particular process of degeneration of the first step, we do not then contend that claim 30 is so limited.

on this range. He was not obliged to do so, and he carefully refrained. He warned that the degeneration must not be carried to the point of disintegration, or of starch solution (line 45, p. 2); but he states no maximum or minimum limit, purposing rather that this water-absorbing power can be 'regulated' (line 68, p. 3). So far from supposing that he must use his first step and carry it to a definite point was that he said he could start the second step, though not as well, with 'certain grades of untreated cassava' (line 81, p. 3)[1]. He then gives a method of testing his proposed base to find whether it is sufficiently degenerated to suit him, the 9 to 1 boiling test (line 125, p. 3); but he introduces this by saying (line 121) 'one way which has been found satisfactory for determining, etc., is.' As to the other test which he suggests, the 170 degree test, he says (line 74, p. 4): 'Also in actual practice I have found that a good glue is produced by treating the base with the chemicals to reduce the water-absorbing power to a point where, etc.' It seems to be true that the 'raw starch' which defendant uses as the base of the process by which it makes its glue is not within the limits of inherent viscosity indicated by either of these operations, although it clearly is within that medium range which is essential to the result. We think this not important in considering the construction of the patent on its face. To confine the base to these two suggested examples (they are examples, not tests) would be to rewrite the specification.

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[1]This was perhaps merely prophetic, because the record indicates that he had not found any raw starch which would perform properly for his second step; but he was at least guarding as well as he could against the possibility that there might be, or might later come into the market, some usable raw starch."

What does the Court mean by saying that the measures of sufficiency of the degeneration as stated in the patent "are examples, not tests"? They are the only measure of the degrees of degeneration in the patent, and without some such measure, the patent would be invalid for insufficiency of disclosure, since the invention admittedly depends upon some particular degree of degeneration.

As soon as these measures of the patent are rejected, the whole thing is again at large and no one can say what degree of degeneration is within the patent or how the product of the patent is to be differentiated from the product of the prior art or from the thing disclaimed when the plaintiff said that it disclaimed the making of glue with three parts of water from any starch except only starch degenerated to the degree described in the patent.

The Court of Appeals accepts as a sufficient yardstick the expression "as good as animal glue for veneering." To Perkins, glue made from the high water-absorptive untreated starches was not as good as animal glue for veneering because it did not have the necessary fluidity, and by that measure it would still be excluded from his patent. In fact, so defined, defendants' glue is not as good as animal glue because it requires expensive and continuously operated powerful mixing machines that animal glue does not require.

As the Court of Appeals of the Second Circuit said in the *Standard case* (287 Fed., 112):

> "Plaintiff has defined its product as 'a new vegetable glue, as good as animal glue for veneering.' We think that this definition is not advanced by embodying in it a laudatory phrase descriptive of intended result."

As we have seen (*ante*, pp. 33 to 35), no such yardstick was applied by plaintiff in the *Solva case*, where it had to differentiate the subject-matter of its patent from the earlier patents of Gerard, Dornemann and Marsden and

from the public use at Poplar Bluff. There the yardstick applied was the 9:1 boil up test of the patent.

In the next paragraph of its opinion in the present case the Court says (R., 650):

> "Coming to the next point in the discussion,—defendant says that it is buying an ordinary raw starch on the market, as it rightly may, and dissolving it into glue by an old process, as it rightly may, and thereby gets the product it is using in its veneering work. This is to say that claim 30 (construed as we do) is invalid for lack of invention."

It is not defendant's position here that because the glue-base it dissolves into glue by the old second-step is an ordinary raw starch bought on the market, the patent is, therefore, not infringed. Nor is it defendant's position that claim 30 would for that reason alone be invalid for lack of invention.

Defendant's position is that the ordinary raw starch defendant uses is the same ordinary raw starch that Perkins rejected. It is a starch of high water-absorptiveness above the range of the Perkins patent and corresponding to the starch that Gerard and Dornemann and Marsden dissolved with caustic to make their glues and that the Brooklyn Cooperage Co. used at Polar Bluff to make its barrel-head glue prior to the Perkins invention; and it is a starch within the range that plaintiff explicitly disclaimed.

The Court of Appeals goes on to say (R., 650):

> "No one knows just why it is that no brand of cassava starch which Perkins could buy about 1908 could be used until after artificial degeneration, while defendant finds that some present regularly marketed raw starch makes a satisfactory base for the second step. It may be that changed methods of cultivation or manufacture have brought the viscosity down to the medium range; it may be that

peculiarities of defendant's dissolving operation take the place of Perkins' preliminary treatment."

The Court's uncertainty at this point deserves closer examination. There is some testimony in the record to the effect that modern cassava starches are less water-absorptive than the marketed cassava starches at the date of the Perkins invention, but none that such starches have the reduced water-absorptiveness of the range of the Perkins patent and none that the particular G. T. A. brand of cassava starch that defendant uses has had any such progressive natural degeneration; and the men who have been engaged in buying starch for the Kane Mfg. Co. and others who have been engaged in buying starch generally have not observed any such degeneration (R., 62). They certainly would have observed it if it had occurred since the price of starch on the market is measured by its water-absorptiveness, the higher the water-absorptiveness the higher the price (R., 405, 410).

The evidence to this supposed progressive natural degeneration is wholly that of plaintiff's expert, Dr. Grosvenor, and is not of so definite a character as to form the proper basis of the judgment of any Court. This whole matter is the best possible illustration of the wisdom of the rule asserted by this Court in the *Minerals Separation* case (250 U. S., 336, 350), where the Court said that to depart from the stated rule of the patent "would subordinate the clear description contained in it * * * to an implied and vague description and classification which would leave the whole subject again at large."

Dr. Grosvenor, discarding the tests of the patent, testified generally that certain marketed cassava starches have undergone progressive degeneration in some unexplained way, during the years subsequent to the Perkins invention; so that what Perkins meant by raw cassava starch when the patent was written is something different from what raw cassava starch now means.

The fact is, however, that the raw starch defendant now uses—G. T. A. brand—is the very raw starch Per-

kins attempted to use at Poplar Bluff and described (*ante*, p. 47) as:

> "Lot 80. This was raw G. T. A. cassava and not suitable for veneer glue."

Upon Perkins' rejection of this particular raw cassava, plaintiff rested its assertion that the Poplar Bluff prior use was not an anticipation of the patent.

Dr. Grosvenor makes the following statement, with regard to G. T. A. raw cassava (R., 71):

> "Q. What can you say of the trend of viscosity changes in the G. T. A. brand such as the defendant uses as testified this morning?
>
> A. G. T. A. is one that I have not been particularly familiar with. I have met a few samples but wherever I have seen the results of its use, the viscosity was medium. I don't know its history."

Still further, it is not pretended by Dr. Grosvenor that any of the commonly sold raw cassava starches on the market, much less the particular grade that defendant uses, has water-absorptive properties that fall within the range measured by the tests of the Perkins patent*

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*See R., 70, where the average tests on a 20:1 boil up gave a viscosity never less than 46. Translated into the terms of the 9:1 test, this would be about 750 (R., 632, line 33). The upper limit of the Perkins range on the 9:1 test is 48. As to G.T.A. brand cassava, Dr. Grosvenor said indefinitely (R., 71) that he had met samples "somewhere near 30 and possibly 35" on the 20:1 test. This would be something like 180-270 at 9:1 (R., 632, line 38). Of the specific G.T.A. starch used as defendant's base here, Grosvenor gave the viscosity as 57 on the 20:1 boil up (R., 76, 78) which is too high to be measured at all in the 9:1 boil up. He said he had not sufficient data to compare the Perkins base with these ordinary raw starches (R., 77), but Mr. Grossman compared them by his standard viscosity determination and found that where water on that determination had a viscosity of 28 seconds, the Perkins base had a viscosity of 80 seconds, less than three times that of water, and defendant's base, 145 seconds, about six times that of water. (R 79)

Furthermore, as late as 1915, plaintiff was using ordinary commercial raw cassava starch dissolved in 3 parts of water and caustic to prove to Judge Sanborn that raw cassava starch would not make the Perkins glue (*ante*, p. 31).

It is no wonder that the Court of Appeals was uncertain as to the effect that changed methods of cultivation or manufacture might have had upon the viscosity of marketed cassava starches and that it could not decide whether defendant's production of starch glue that can be used in veneering, is dependent on that or upon peculiarities of defendant's dissolving operation that take the place of Perkins' preliminary treatment.

The fact is, as we have seen, that by more energetic and powerful and long continued stirring, in accordance with the Gerard and Dornemann patents, defendant is able to handle a heavy, tough and ropy glue that does not have the fluidity of the Perkins glue and to that extent that peculiarity of defendant's dissolving operation takes the place of Perkins' preliminary treatment. It does not produce the glue of the Perkins patent but it makes it possible to use in veneering the glue that Perkins rejected.

This again only illustrates the impossibility of measuring the degree of water-absorptiveness of Perkins' starting material, or of any starting material alleged to be the equivalent of Perkins' starting material, by reference to the finished product. If there is interposed between the starting material and the finished product a process step that does or may affect the quality or utility of the resulting material, it cannot be that either the quality or the utility of the resulting material measures the quality of the starting material.

The Court of Appeals then referred more specifically to the dicta of the Court of Appeals of the Second Circuit in the *Standard case* to the effect that if nature had evolved a substitute for Perkins' starting material it would be a controlling thing, and added:

> "The utmost effect of defendant's claim would be to make the situation the same as if the present base used by defendant, the Kane base, had been freely for sale in 1910 as it is today; and this is practically the situation created by the now conceded fact that Perkins' base product of his first step was old at the time of Perkins' work."

This assertion involves the assumption, contrary to the fact, that the Kane base defendant now buys is the Perkins base. Perkins said in his amended specification that there existed at the time certain grades of cassava starch that would answer his purpose, and perhaps such grades of cassava starch did exist at that time. If so they were characterized by a water-absorptiveness within the range measured by the tests of the Perkins patent. But the Kane base is not now and never has been a starch having that low water-absorptiveness.

Further discussing the question of sufficiency of invention in the subject matter of the Perkins patent, the Court pointed out that in former litigation it had been held that Gerson & Sachse had disclosed substantially Perkins first degenerating step and his resulting degenerated glue base, and said (R., 651):

> "Hence the question must be: 'Was there invention in taking this known starch base, which had the essential degree of viscosity, and making a real glue out of it, as Perkins for the first time did?' We see no sufficient reason for a negative answer."

Defendant here is not seeking a negative answer to that question. It was answered in the affirmative in the *Solva case,* and this defendant has not sought to attack that decision. But the "resulting glue-base" of the Perkins first degenerative step and of the Gerson & Sachse

patent was a starch having water-absorptive properties within the limited range measured by the tests of the Perkins patent, and defendant does not use such a starch.

In the next paragraph of the opinion the Court says (R., 652):

> "It is said that those who had used a high viscosity starch base with a small amount of water *had the right* to use any known quality of starch, and that those (like Gerson & Sachse) who had used starch of a medium range in viscosity, with large quantities of water, *had the right* to use any amount of water, more or less." (Emphasis by the Court.)

and rejects such an argument as ground for holding the Perkins patent invalid for lack of invention. Defendant here does not say anything of that kind. To say so would be to deny the correctness of the decision in the *Solva case*, and defendant agrees that for the purposes of the present case it may be assumed that it was invention to select, as Perkins did, a starch of particular water-absorptiveness and combine it with a particular quantity of water to make the glue of his patent. But that invention has not been used by this defendant.

With respect to the prior use at Poplar Bluff, the Court of Appeals said (R., 653):

> "The alleged public use by Perkins for more than two years was carefully considered in the Solva case (infra), and was held ineffective because it was composed of a series of efforts which did not pass out of the experimental stage into fully developed invention until less than two years before November, 1908. We see no occasion to reach any other result on that subject."

That was the holding of Judge Sanborn in the Solva case, but the Court of Appeals in that case said of the Poplar Bluff use (251 Fed., 70):

> "From the record it is fairly shown that in making certain changes in the glue and machinery, the result was satisfactory in that plant, and, indeed, it seems, as above stated, that the same glue is still in practically exclusive use there. It was used in such quantities and so generally that, whatever its use was, it was not an experimental use."

and saved the Perkins patent from invalidity by accepting plaintiff's differentiation of the Poplar Bluff glue made from untreated high water-absorptive starches from the glue of the Perkins patent made from starches of more reduced water-absorptiveness.

Coming to the discussion of the former litigation and of the disclaimer resulting therefrom, the Court says it "presents to our mind the most serious obstacle to plaintiff's case" (R., 645); and then the Court starts that discussion with an initial mistake as to what was charged to be an infringement and what was adjudicated with respect to infringement in the *Solva case.*

The Court said of the base charged to be an infringement in the *Solva case* (R., 655):

> "It appears that—to accept the defendants' argument—'the major portion' of defendants' output was raw cassava starch, just as is now the case (the present Kane base is used by the present defendant)."

We do not know what "defendants' argument" the Court here refers to. It is not true in any sense that "the major portion" of defendants' glue-base in the *Solva case* was untreated starch, and it is not true that any of it was raw cassava starch in the sense that it was, like the Kane base here involved, a starch having water-

absorptiveness higher than the range measured by the tests of the Perkins patent.

The fact is that the raw cassava starch involved in the *Solva case* was a particular and peculiar starch of low water-absorptiveness responding to the tests of the Perkins patent. That is explicitly set forth in the brief filed by plaintiff's counsel in the Court of Appeals in the *Solva case* as follows:

> "It appears that the defendant Solva Company had shipped some *particular and peculiar* cassava dry glue base to their customers, which they did not treat or process at all (Qs361-364, p. 645), and which did not need any processing as it did the same work as the regular Solva goods and behaved just like the processed goods when tested (Qs365-370, p. 646). Defendants tested it out first in the same way they did the processed goods (Qs373, 374, p. 646) and it tested the same (XQ467, p. 658). *It is clearly a brand of cassava, which in the milling or handling of it, has already become sufficiently degenerated.* It was evidently the same or the equivalent of the processed Solva, as they got no complaint from it (Q372, p. 646, XQ470, p. 659). This idea all originated with Perkins (Qs437-443, p. 655), and as hereinbefore pointed out, was fully contemplated by the reissue Patent 13,436 in suit." (Emphasis ours.)

The statement in the above quotation that this idea of the possibility of using a brand of starch which in the milling or handling of it has already become sufficiently degenerated "was fully contemplated by the reissued patent No. 13,436 in suit" exposes another error made by the Court of Appeals in the case at bar and vitally affecting its conclusion as to the scope of the Perkins patent and the effect of the disclaimer.

As we have seen, in discussing the Perkins patent (R., 649-650), the Court said:

> "So far from supposing that he must use his first step and carry it to a definite point was he that he said he could start the second step, though not as well, 'with certain grades of untreated cassava.' "

And with reference to the disclaimer, the Court said (R., 658):

> "The fair intent of this disclaimer as to the second step claims was, we should think, to limit them to a process where the material with which the process step begins is the less than high viscosity indicated by the teachings of the patent to be necessary to produce the result at which the second process step was aimed."
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> • • • • • • •
>
> "The reference was not to the base which had degenerated in the manner specified in the patent,[3] but to one degenerated (or degenerate) to the extent so specified, and this must be interpretated in connection with the statement remaining in the specification, that the second step could be practiced, and the ultimate product obtained by commencing the second step with raw untreated cassava starch."

[3]As was by error said in one of the later decisions.

Thus the Court of Appeals, on the basis of the expression "certain grades of untreated cassava" inserted in the specification by amendment without oath after the patentee died, found that the scope of the patent extended beyond the range of degeneration fixed by the tests of the patent; that the Court of Appeals of the Seventh Circuit had so held in the *Solva case*, and that the

disclaimer was not intended to, and did not limit the patent to claims made from starch having water absorptive properties lying within that range.

We have seen (ante, p. 24) that unless this remark, added without supplemental oath, is to be interpreted in accord with the rest of the specification, it was a vital change therein and destroys the patent, since there is no oath to show that the inventor was or believed himself to be the inventor thereof.

We shall now proceed to show that this remark, so inserted in the specification after the inventor's death, was not understood by plaintiff (who inserted it), at that time or at the time the disclaimer was made, to extend beyond the limits of degeneration marked out by the tests of the patent. On the contrary, it was then understood to mean, and plaintiff asserted that it meant, that there might be found in nature certain grades of untreated cassava that had already been degenerated by special or peculiar method of manufacture or otherwise, to within that specified range.

The words "as hereinbefore pointed out" (ante, p. 71) in the foregoing quotation from plaintiff's brief in the *Solva case*, refer to the following statement found on pages 49-50:

> "It makes no difference how the starch is degenerated, provided it is degenerated to the right point. If the miller, in extracting the starch from the roots or other source and purifying it, employs chemical reagents which at the same time degenerate the starch, it may happen that some brands of starch found on the market need little or even no first step degeneration. If a starch be found in commerce already modified so that its viscosity *is two or three times that of water by the Perkins test*, then it may not be necessary to further modify it (p. 127, fol. 648; p. 495, fol. 1335). That such is the occasional

facts appears from the testimony. Now and then a brand of cassava is found that may be employed untreated (p. 134, fol. 660). It appears from the testimony of defendants' foreman that the defendants have to some extent used such a brand which did not need any processing or first step treatment, but it did practically the same work as the regular Solva glue of the defendants and behaved just like the processed goods when tested out in the same way as the processed goods are tested and defendants got no complaint from it (Qs361-374, pp. 645-656, XQ467, p. 658, XQ470, p. 659). Dr. Carmichael says that while this brand used by defendants would not be so good, yet it comes sufficiently near to the Perkins and defendants' regular product to be spreadable and make good strong wood joints (p. 158, fol. 705). This idea originated with Perkins (Qs437, 443, p. 655) and indeed is specifically mentioned in Reissue Patent in suit (p. 3, lines 78-83), where the inventor says:

> 'Thus, by proper adjustment of conditions of mixing, I am able to produce this glue even with certain grades of untreated cassava carbohydrates and with other starches and conversion products starchy carbohydrates),' "

and on page 85, as follows:

> "Defendants-appellants say that the original specification did not contain the statement that in some cases starch might be used for the second step of the process, just as found on the market. It goes without saying that if starch is found on the market which is already degenerated to the precisely desired point, then no further degenerating treatment

need be given it. By special or peculiar methods of manufacture some such starches are occasionally found on the market. But the original specification clearly contemplated such a possibility. For example, claim 15 of the original specification was for 'the treating of a starch with a solvent of cellulose to give it adhesive properties.' Here the purpose plainly was to cover a starch that might be found in the market already sufficiently degenerated. This, therefore, was not new matter."

It was upon the basis of that interpretation of this addition to the specification by amendment that the Court of Appeals in the *Solva case* said (251 Fed., 66):

"While the added matters may in a sense be new, we do not regard them of so important a character as to constitute that class of new matter, which would be invalid for want of an oath under the circumstances. They are related to the original purposes and objects set out in the original specification and claims, though some of them approach the border line."

It was in this sense that the words were interpreted by plaintiff's expert Dr. Grosvenor, who has testified as expert in these cases from the beginning, and who filed an affidavit directed to other questions than this new matter at the same time that the amendment was filed (R., 1102, 1119 and 1122-1125).

Dr. Grosvenor testified in the *West Michigan case* on October 28, 1919, as follows (stipulated into this case, R., 121):

"The patent points out, page 3, lines 80 to 83, that certain grades of untreated cassava carbohydrates

and other starches may be used without any preliminary treatment thereof. It would be perfectly obvious to a starch chemist, after Perkins pointed out that starch of low water absorptiveness is desired, that many raw starches more or less in the natural condition, can be used, but he points it out specifically. He found the difficulty, however, of specifically illustrating the proper choice of raw grades, and in order to make that a little more clear permit me to touch for just a moment upon the chemical constitution of starch."

Then Dr. Grosvenor interjected two pages of discussion on the chemical nature of starch, and (R., 123) concluded by saying:

"So that Perkins faced a great difficulty in telling which starch to select.

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Perkins, in order to explain just the condition of the starch he desired to use gives us a specific sample (example) the taking of relatively high viscosity starches, or starches of high water absorptive power and degenerating them to the right point by a chemical treatment. He prefers to start with raw starches."

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"At the same time as indicated, he clearly points out that once the character of base is known by carrying out that process he may take raw starches as he finds them in the light of that knowledge. The condition of the starch having been ascertained, the

> starch chemist would be able to select by comparing therewith various starches as found on the market, which would be suitable" (R., 124).

* * * * * * *

> "To aid in recognition of suitable starches degenerated to a suitable low water absorptiveness to make his glue, Perkins points out several tests" (R., p. 125),

which Dr. Grosvenor enumerates at length (R., 125-127) and says (R., 126):

> "There are many statements in the patent which not only indicate how far the starch should be degenerated if a preliminary treatment is necessary, but these tests indicate what kind of starches require no such preliminary degenerating treatment (because they are already in a condition where their water-absorptiveness has been reduced to the necessary degree, and they may have been formed in that condition) and may, therefore, be selected for use without preliminary treatment. Obviously the selection of the starch already suitable reduced in water-absorptiveness is equivalent to the preparatory treatment."

And (R., 130):

> "However, Perkins, realized it was not necessary to use any preliminary first step degeneration treatment becaues some starches come on the market with their water absorptive properties sufficiently reduced. He points this out on page 3, lines 78 to 83:

> " 'Thus by proper adjustment of conditions of mixing I am able to produce this glue even with certain grades of untreated cassava carbohydrates and with other starches and conversion products.'

And (R., 119-120).

> " 'The essence of the process technically consists in first selecting or producing, either by intermixture or chemical treatment, fermentation or otherwise, a starch of suitably low water-absorptive properties, and then dissolving it with about three parts of water or less and caustic soda to produce the homogeneous, viscous and fluid glue having substantially the properties of animal glue for veneering.' "

CONCLUSION.

We submit, therefore, that the decision of the Circuit Court of Appeals for the Sixth Circuit should be reversed and the case remanded with instructions to dismiss the bill of complaint as to the Kane base on the ground of non-infringement.

Respectfully submitted,

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